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Efeitos negativos e limitações da gamificação no período entre 2005 e 2020: uma revisão sistemática da literatura

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Departamento de Ciências e Tecnologias da Informação

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Resumo

A gamificação tem sido definida como a aplicação de elementos de jogo a contextos que não são de jogo (Deterding et al, 2011), de forma a promover comportamentos nos indivíduos (Hamari & Koivisto, 2015). A investigação acerca da gamificação tem sido desenvolvida numa perspetiva de procura de benefícios em áreas como o marketing, a gestão e a educação (Rodrigues, Oliveira & Rodrigues, 2019). Porém, constata-se uma lacuna na literatura relativamente a uma investigação que contemple o lado negativo da gamificação e as suas potenciais limitações. O objetivo geral deste estudo consistiu em compreender os efeitos negativos e limitações da implementação da gamificação ou de elementos de jogo mencionados na literatura científica de diversas áreas. Para tal, elaborou-se uma revisão sistemática da literatura cobrindo 86 textos científicos publicados entre 2005 e 2020 em revistas científicas de *ranking* maior ou igual a Q2. Utilizou-se o Leximancer para extrair os principais temas e conceitos abordados. Constatou-se que os temas "gamification", "aprendizagem", "desempenho", "comportamento" e "marca" foram os mais explorados pelos investigadores no período analisado. Os conceitos "marca", "efeitos", "contexto" e "comportamento" são aqueles que mais se relacionam com o conceito "negativo", que se associa também com os conceitos "controlo" e "desempenho". Detetou-se que a gamificação tem, sim, um lado negativo, que está dependente do contexto e que se manifesta principalmente no âmbito de situações de aprendizagem. A base teórica construída neste estudo permitirá a investigação sobre os fatores contextuais que limitam a eficácia da aplicação da gamificação em situação de aprendizagem.

Palavras-Chave: Gamificação; lado negativo da gamificação; dark gamification; análise sistemática da literatura

Abstract

Gamification has been defined as the usage of game elements in non-game contexts (Deterding et al, 2011), to promote certain behaviours in individuals (Hamari & Koivisto, 2015). Since it is a recent, gamification has been research from a benefit search point of view in areas like marketing, management and education concept (Rodrigues, Oliveira & Rodrigues, 2019). However, there is a lack of transversal studies about the negative side of gamification and its potential limitations. The main purpose of this study was to understand the negative effects and limitations of the implementation of gamification or gamified elements, mentioned throughout scientific literature of several areas. We have thus performed a systematic review of literature covering 84 scientific texts published between 2005 and 2020 in scientific journals of Q2 or higher. We then used Leximancer to extract the main themes and concepts considered. We concluded that "gamification", "learning", "performance", "behaviour" and "brand were the main themes underlying the investigation conducted in the analysed period. Moreover, "brand", "effects", "context" and "behaviour" are the closest concepts to "negative", which is also associated with "control" and "performance". We confirmed gamification does have a negative side, which depends on the context and is mainly present in learning situations. The theoretical basis brought by our study allows for future investigation on the context factors that hinder the efficacy of gamification in learning situations.

Keywords: gamification; negative side of gamification; dark gamification; systematic literature review

Índice Geral

Índice de Tabelas

Índice de Figuras

Glossário de Abreviaturas e Siglas

CAQDAS – *Computer Assisted Qualitative Data Analysis System*

MOOC – *Massive Online Open Courses*

RSL – Revisão Sistemática da Literatura

TETEM – *Technology-Enchanced Training Efectiveness Model*

.

Capítulo 1 – Introdução

1.1. Enquadramento do tema

A gamificação tem sido entendida globalmente pela comunidade científica como a utilização de design de jogos em contextos que não são de jogos. Pode ser caraterizada como uma estratégia de desenvolvimento de elementos e mecânicas de jogos que são utilizados em atividades não lúdicas ou consideradas sérias, tendo como objetivo principal influenciar o comportamento das pessoas. (Deterding et al, 2011)

A gamificação é um conceito recente em popularidade e o seu estudo e aplicação têm estado, tendencialmente, associados à investigação do comportamento motivacional aplicada na área dos sistemas de investigação (Rodrigues, Oliveira, & Rodrigues, 2019).

A comunidade científica vai acompanhando o surgimento e sedimentação de novas tecnologias, procurando identificar e avaliar os seus usos, potencialidades, aplicações e repercussões a variados níveis.

Estes estudos não emanam apenas da área de sistemas de informação ou de áreas de investigação ligadas às engenharias e à tecnologia em si, tendo um maior alcance. Este alcance é exemplificado por estudos com áreas de conhecimento tão díspares quanto: a relação entre o uso de redes sociais e o consumo de fentanyl (Al-Rawi, 2019); o impacto da automatização das recomendações de notícias na receção das mesmas (Beam, 2014); os riscos associados à utilização de social media em campus universitários (Linvill, 2019); a relação entre determinadas características de personalidade e os comportamentos online (Moor & Anderson, 2019); e os limites da privacidade na era do big data (Baruh & Popescu, 2017). Áreas como a medicina, a psicologia, os estudos do comportamento, a educação e o marketing aplicam e estudam aplicações e impactos de novas tecnologias nos seus respetivos campos de atuação.

No entanto, os efeitos da gamificação nem sempre reúnem o consenso entre os investigadores, sendo necessários mais estudos que atestem os efeitos positivos e negativos da aplicação da gamificação (Toda, Valle, & Isotani, 2018).

Quando uma nova tecnologia surge no horizonte, porém, há uma tendência para a sobrestimar, não prestando muita atenção a potenciais limitações e ineficácias – uma "fé irracional" (Landers, 2019, 137) no seu potencial transformativo e capacidades, alimentada pelos seus criadores e promotores.

Após uma fase na qual a tecnologia é sobre aplicada, incluindo áreas nas quais tende a ser pouco ou nada eficaz, segue-se normalmente um período de desapontamento com a descoberta das primeiras grandes falhas (Landers, 2019). Algumas tecnologias emergentes poderão conhecer, aqui, a sua reta final; porém, muitas outras transitam depois para uma fase em que é reacendido o interesse do público pela mesma, "iluminado" por uma nova perspetiva, seguindo-se depois uma fase de estabilização do seu uso, na qual a outrora tecnologia emergente passa a fazer parte integrante do tecido da vida normal (O'Leary, 2008).

Esta evolução ou ciclo de vida das tecnologias é explicitada pelo Hype Cycle da Gartner existente desde 1995 (O'Leary, 2008) no qual se desenha a trajetória evolutiva seguida pela maior parte das tecnologias, e cujas fases são: gatilho tecnológico (*technology trigger*), ponto alto das expetativas inflacionadas (*peak of inflated expectations*), calha de desilusão (*trough of disillusionment*), rampa de iluminação (*slope of enlightenment*) e plataforma de produtividade (*plateau of productivity*) (O'Leary, 2008).

De acordo com O'Leary, 2008, a investigação científica sobre uma determinada tecnologia segue um caminho próximo ao Hype Cycle, sendo que alguns tipos de estudos são mais comuns numa determinada fase do ciclo (Figura 1).

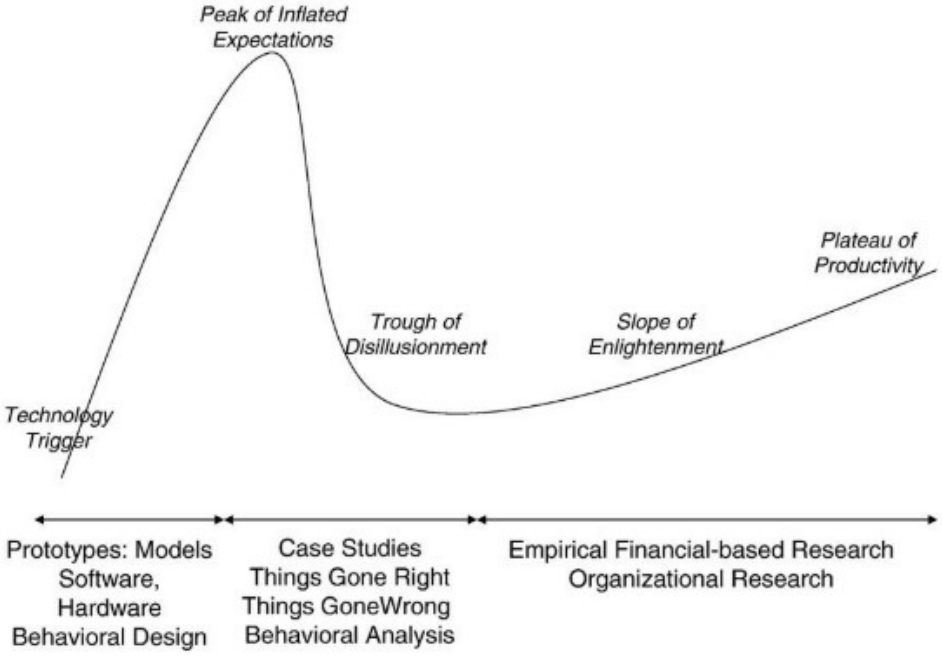

Figura 1- Investigação por estágio da curva (O'Leary, 2008)

Numa fase inicial de encantamento, o pico das expetativas inflacionadas, não se encontram geralmente as limitações da tecnologia emergente em causa, sendo a maior parte dos artigos encontrados estudos de caso e estudos empíricos de casos de aplicação.

Na fase seguinte, a calha de desilusão também conhecida como "fase de desencantamento", é mais provável que os estudos feitos se foquem no que correu mal nas experiências anteriores, colocando o foco nas limitações e falhas dessa tecnologia em particular. Assim, é na fase de iluminação que, segundo O'Leary (2008), os investigadores tendem a produzir estudos mais compreensivos, que incluem um balanço de pontos positivos e negativos.

A gamificação está incluída nos Hype Cycles da Gartner desde 2011. De acordo com Dale (2014), esta encontrava-se enquadrada na fase *peak of inflated expectations*, mesmo no topo da curva; porém, em 2015, desapareceu desta análise anual por completo.

Segundo Landers (2019), a gamificação terá sofrido, após a sua subida meteórica para o topo das expectativas, uma queda abrupta – "*a crash*" – e, recentemente, um aumento de popularidade, o que sugere que no momento presente, esta se encontre na fase rampa de iluminação "*to date, management gamification, much like gamification more broadly,*

has experienced a meteoric rise, a crash, and, mostly recently, a slow increase in popularity" (Gopaladesikan, 2012, in Landers, 2019, pg. 137).

O estágio da curva do Hype Cycle em que a gamificação parece incluir-se traz a possibilidade de estudar potenciais efeitos adversos e limitações na aplicação da gamificação.

Assim sendo, o potencial para a continuação da investigação dos desenvolvimentos das aplicações informáticas e os seus efeitos no comportamento no comportamento das pessoas, assim como a sua relevância deste âmbito da área de estudo, levou-nos a investigar os efeitos negativos da gamificação – "the dark side" – bem como as suas limitações.

1.2. Motivação e relevância do tema

A temática dos possíveis efeitos negativos e limitações da gamificação surge como uma área de interesse académico, mas também como uma possibilidade de procurar agregar conhecimento profissional numa área que ainda tem espaço disponível para tal.

Através da revisão da literatura, foi possível constatar uma lacuna no que diz respeito à existência de estudos que sistematizem os potenciais efeitos negativos da gamificação e das suas aplicações, bem como as suas limitações.

Hyrinsalmi, Smed & Kimpa (2017) desenvolveram uma revisão de literatura secundária sobre gamificação e concluíram, da sua revisão do estado da arte, a necessidade de se desenvolverem estudos mais alargados sobre os potenciais efeitos negativos da gamificação de modo a identificar as suas causas e efeitos, em oposição a apenas apontar problemas em estudos de caso. “We should move our attention from tackling limiting problems to study and understand harmful issues.” (Hyrynsalmi, et al 2017).

Além do carácter recente da temática a tornar particularmente apelativa para constituir tema de investigação, o entusiasmo construído em redor das potencialidades da gamificação poderá ter deixado na sombra, de certa forma, as suas potenciais limitações da sua eficácia e questões éticas a ela subjacentes. Nesta linha, seria interessante compreender quais são as preocupações principais da comunidade científica acerca da gamificação e das suas aplicações, bem como as suas limitações.

1.3. Questões e objetivos de investigação

Com este estudo, pretende-se compreender os efeitos negativos e limitações da implementação de gamificação ou de elementos de jogo mencionados transversalmente na literatura científica de diversas áreas. Deveremos, assim, ser capazes de mapear não apenas conceitos ligados aos efeitos negativos inerentes à gamificação como também as suas potenciais limitações que tenham já mencionadas pela comunidade científica.

Desta forma, colocamos as seguintes questões:

1. Quais os conceitos associados aos efeitos negativos da gamificação?
2. Quais as limitações da gamificação?

O objetivo geral deste estudo consiste em compreender quais os efeitos negativos (limitações e potenciais efeitos nefastos) da gamificação que têm sido identificados ou referenciados pela comunidade científica nos últimos 15 anos.

Os objetivos específicos, são:

- Efetuar uma revisão sistemática da literatura acerca dos efeitos negativos da tecnologia através da compilação de artigos científicos publicados em revistas científicas de topo (Q1 e Q2).
- Identificar os principais temas subjacentes aos estudos que contemplam o lado negativo da gamificação.
- Identificar conceitos que mais estreitamente se relacionam com as limitações da gamificação.

1.4. Abordagem metodológica

Para o tema de investigação proposto, optámos pela seguinte abordagem metodológica, a qual se encontra refletida no diagrama da Figura 2.

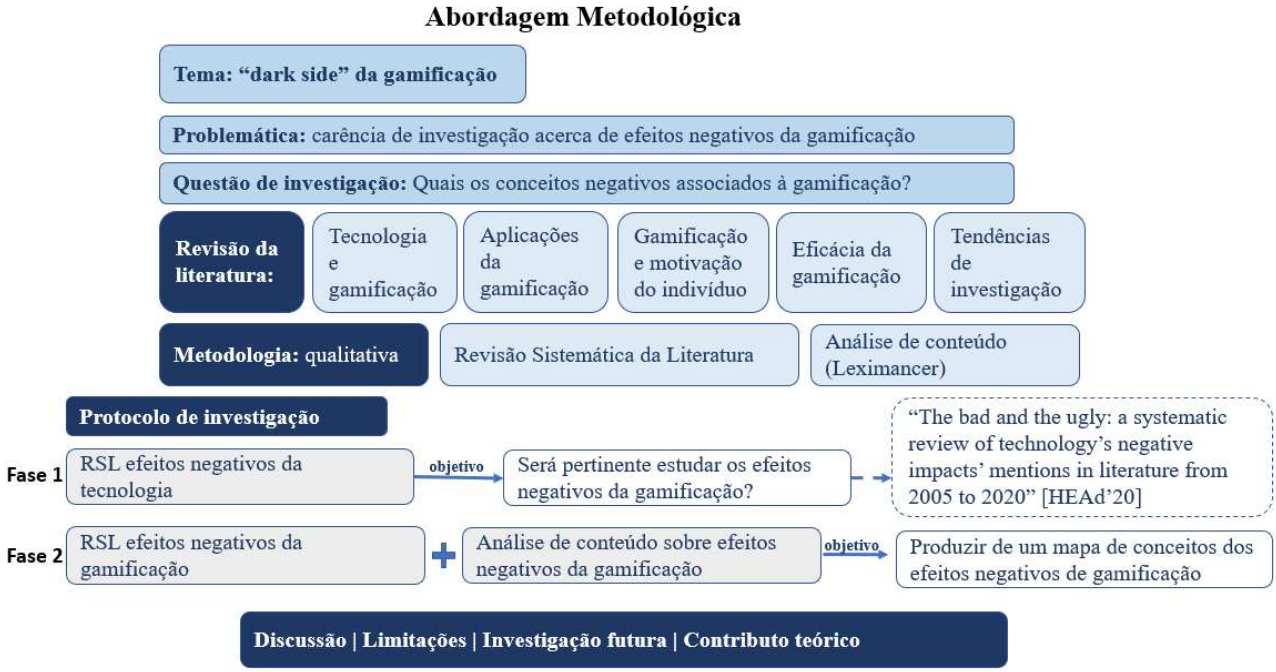

Figura 2 - Abordagem metodológica utilizada neste estudo

Em primeiro lugar, proceder-se-à literatura produzida entre 2005 e 2020 acerca de gamificação, procurando sistematizar os conceitos de gamificação e as suas aplicações.

Seguidamente, procedeu-se a uma revisão sistemática da literatura científica publicada, no mesmo período acima mencionado, nas principais revistas – ranking igual ou superior a Q2 - das suas respetivas áreas, e que aprofundassem os efeitos negativos e limitações do uso de tecnologia.

O mesmo método qualitativo foi utilizado, depois, para compilar um conjunto de textos acerca dos efeitos negativos e limitações do uso da gamificação ou de elementos gamificados.

Na Fase 2 da investigação, efetuou-se uma análise de conteúdo aprofundada da amostra final de textos sobre gamificação, utilizando uma ferramenta de análise quantitativa e text-mining, o software Leximancer.

A escolha do Leximancer como ferramenta para este estudo partiu do seu poder de analisar grandes quantidades de dados, permitindo a elaboração de uma análise conceptual com base em dados sob a forma de texto (Smith, 2003).

As vantagens da utilização do Leximancer foram documentadas através de estudos comparativos da sua performance com a de outras ferramentas de análise de texto como o Nvivo (Sotiriadou, Brouwers, & Le, 2014) ou o Discursis (Angus, Rintel, & Wiles, 2013), destacando-se na forma clara como os resultados são apresentados graficamente, facilitando a sua leitura. Mais ainda, destacam-se estudos empíricos que usam o Leximancer para tratar uma grande quantidade de dados sob a forma de texto e obter mapas conceptuais. Como exemplos, temos o estudo de Tseng et al. (2015) acerca do contributo dos blogs de viagens na formação de uma imagem da China favorável ao turismo, o de Chiu, Bae & Won (2017) que mapeou as experiências dos turistas ao assistir a jogos de basebol na Coreia, ou o estudo de Rodrigues, Oliveira e Rodrigues (2019) do qual resultou o primeiro mapa de conceitos ligados à gamificação.

Assim, recorremos à aprendizagem não-supervisionada através do uso do Leximancer, de forma a identificar um conjunto de conceitos e temas de conotação negativa que estejam contidos na amostra final de textos científicos a nível dos abstracts deste conjunto de artigos.

1.5. Estrutura e organização da dissertação

O presente estudo está organizado em cinco capítulos que pretendem refletir as diferentes fases até à sua conclusão.

No primeiro capítulo explica-se a pertinência e relevância da escolha do lado negativo e limitações da gamificação como tema de investigação, qual a motivação para o estudar, quais os objetivos deste trabalho e como pretendemos atingi-los.

O segundo capítulo reflete o enquadramento teórico do tema, designado por revisão da Literatura. Neste segmento, abordou-se em primeiro lugar os precursores da gamificação, assim como a génese e evolução do próprio conceito. Também neste capítulo, reviu-se algumas aplicações da gamificação no contexto de estudos empíricos. Seguidamente, abordou-se a eficácia da gamificação à luz da conceptualização de gamificação eficaz de Kappen & Nacke (2013). O capítulo da revisão da literatura é fechado com um resumo das críticas feitas pela academia à gamificação, e com as tendências de investigação acerca do tema.

O terceiro capítulo é dedicado à descrição de todos os pontos do protocolo de investigação desenhado para este estudo, explicitando a escolha da revisão sistemática da literatura no contexto de investigação em Sistemas de Informação. Descrevem-se, ainda, os passos para a obtenção da amostra final de 86 artigos de revistas científicas de Q1 e Q2, que possuem referências ao lado negativo ou limitações da gamificação. Por fim, abordou-se o Leximancer enquanto ferramenta de aprendizagem não-supervisionada e as vantagens da sua utilização no contexto do presente estudo para a descoberta dos principais temas e conceitos subjacentes ao tema.

No quarto capítulo apresentamos a análise dos resultados obtidos, de acordo com a metodologia descrita no capítulo anterior. Os temas e conceitos que foram desvendados através da análise conceptual do Leximancer foram analisados à luz da perspetiva instrumentalista da gamificação, que a vê como um meio para obtenção de benefícios, assim como da definição de gamificação eficaz de Kappen & Nacke (2013).

No quinto e último capítulo apresentam-se as principais conclusões deste estudo: o lado negativo da gamificação surge na sua aplicação desadequada ao contexto, o que causa uma falha na experiência do indivíduo, não sendo produzidos os benefícios esperados. O contexto é, assim, determinante para o sucesso da gamificação, o que nos leva a concluir que existem, efetivamente, limites ao que faz sentido gamificar. Neste

capítulo, revemos ainda as limitações da nossa pesquisa e propomos futuros caminhos de investigação.

Capítulo 2 – Revisão da Literatura

2.1. Gamificação

2.1.1. Origens e precursores

Embora o léxico da gamificação apenas tenha atingido o topo das atenções na última década, mais especificamente nos últimos anos, na realidade o conceito de inclusão dos jogos no dia a dia da sociedade não é uma área recém-explorada.

Apontados como sendo um dos principais precursores da gamificação, os "jogos sérios"[1], ou "jogos para propósitos sérios" remontam já à antiguidade. Inicialmente, seriam desenvolvidos e utilizados para o desempenho de atividades e práticas do foro militar, tendo apenas saltado para outras esferas a partir do século XX. Foi apenas nessa altura que a utilidade dos jogos sérios passou a ser considerada para utilizações nos campos da gestão e da educação (Deterding, Dixon, Khaled, & Nacke, 2011).

Na primeira parte do século XX, alguns autores como Huizinga (1938 /2002) e Caillois (1961) debruçavam-se já sobre as relações entre a sociedade e os jogos, defendendo a relevância cultural destes últimos (Cassone, 2017).

Com a generalização da posse de smartphones, da Internet de banda larga e dos computadores pessoais, os jogos digitais têm um lugar mais proeminente nas nossas vidas, e elementos de jogo vão sendo incluídos nas atividades diárias das pessoas, nas suas plataformas sociais online e mesmo nas suas atividades profissionais (Brigham, 2015; Mehri,2016). Outras razões para a permeabilidade das pessoas à inclusão de jogos e elementos de jogo no seu dia-a-dia e para a sua boa vontade em fazê-lo, incluem o prazer induzido pelos mesmos, assim como os visuais apelativos, a realização, a possibilidade de escapar à realidade e, ao mesmo tempo, o facto de permitirem interação social (Mehri, 2016).

Assim, pode considerar-se que simbiose entre jogos e sociedade está contida no ADN da gamificação. De acordo com Cassone (2017), esta relação é sustentada e reforçada por quatro vetores principais: a transformação de tarefas mecânicas em desafios e de dificuldade progressiva; o trazer para o universo visível um conjunto de ações que, de outra forma, não granjeariam reconhecimento por parte dos pares; a criação de desafios que se adequam ao nível e às capacidades de cada jogador; e o conceito de justiça latente

[1] 'serious games', no conceito original.

nos jogos, que permitem a atribuição de um leque variado de recompensas. "*Games are the perfect solution to the limits and issues of contemporary life*"(Cassone, 2017).

Em paralelo com a transição dos "jogos sérios" para outras esferas, surge um novo conceito ligado a esta perspetiva de ludificação da cultura: o de "jogos penetrantes"[2] . Nesta lógica de ludificação da cultura, estes são explicitados por Montola, Stenros e Waern (2009) como sendo jogos que possuem uma funcionalidade ou um conjunto de funcionalidades ou características de jogo para expandir a jogabilidade a outras esferas espaciais, temporais e sociais.(Deterding et al., 2011).

Ainda nos anos oitenta do século XX, outros estudiosos dedicaram-se à exploração de temas que podemos considerar estarem na raiz do conceito de gamificação: em 1981, Malone preocupou-se com a construção de interfaces que agradassem ao utilizador; Carrol e Thomas (1982) focaram-se na transformação de atividades rotineiras de forma a torná-las menos aborrecidas, dando os primeiros passos para o cruzamento das noções de diversão e facilidade de uso.

A aliança entre a construção jogos como artefactos usados para treinar, educar e persuadir motivou então o crescente interesse da comunidade científica nas interações humano-computador e, na primeira década do século XXI, a investigação começou a debruçar-se nas experiências dos utilizadores nestas interações, nas suas motivações e no design pensado para o prazer e para a diversão.

Na perspetiva de Deterding (2017), um conjunto de fatores de pendor multidisciplinar – como, aliás, é o próprio conceito de gamificação - ter-se-á conjugado para o surgimento e estabelecimento da gamificação em si enquanto conceito. No campo tecnológico, o aparecimento e generalização de sensores baratos e de dispositivos de *tracking* que permitem o acompanhamento de várias tarefas do dia-a-dia, e a popularização dos videojogos, aliaram-se a um reajuste de foco da área de Web *analytics* para os indivíduos e os seus comportamentos (Deterding, 2012). Os jogos tornaram-se, aliás, no maior veículo de lazer da última década, combinando a procura hedonista pela diversão com um pendor mais utilitário (Hamari & Keronen, 2017).

A par destes fatores, a política mundial reajustou o seu foco para colocar a experiência do indivíduo enquanto cidadão no centro da sociedade; paralelamente, assistiu-se a uma transição para valores pós-materiais que se traduz na valorização das experiências e

[2] 'pervasive games', no conceito original

vivências do indivíduo em oposição aos bens materiais de consumo. Os modelos de negócio adaptaram-se também naturalmente, passando a ser alimentados pela necessidade de inovação e pelas experiências do cliente tornado prosumidor, que passa a estar no centro do negócio (Hamari & Keronen, 2017).

A combinação destes fatores facilitadores descritos por Deterding (2017) e da evolução do interesse científico na conjugação da satisfação – o *enjoyment* – com obrigações daria origem à gamificação enquanto conceito.

2.1.2. Uma multiplicidade de definições

Fortemente ligado à ludificação – definida por Fuchs (2013) como o processo de permeabilização da sociedade aos métodos, valores e atributos dos jogos - o conceito de gamificação seria cunhado apenas em 2008. O seu uso seria, porém, mais generalizado a partir de 2010, sendo utilizado para descrever a aplicação de design de jogo a outras áreas (Deterding et al., 2011).

As definições de gamificação são múltiplas. No entanto, a primeira e mais referenciada definição de gamificação é a de Deterding, Dixon, Khaled, & Nacke (2011), de acordo com a qual esta se trata do uso de elementos de design de jogo em contextos de não-jogo. Mais ainda, estes autores consideram que o próprio conceito delimita um grupo de fenómenos que inclui design de jogos, interações próprias de jogos e jogabilidade em si. Rice (2012) coloca o foco deste conceito sobre o design, utilizando-o para definir gamificação como o redesenhar de atividades do quotidiano, retirando inspiração do *design* de jogos.

A gamificação pode também ser definida como um processo através do qual se incorporam elementos de jogo em objetos que não possuem qualquer característica de jogo – *gameless objects* – de modo a suportar essas mesmas características (Yohannis, Denny Prabowo, & Waworuntu, 2014). A mesma lógica é seguida por Morford, Witts, Killingsworth, & Alavosius (2014) que definem a gamificação também como um processo, através do qual atividades não-jogo são desenhadas para serem mais próximas de um jogo. Esta definição vai também buscar a Rice (2012) a ideia de redesenho de atividades do dia-a-dia com inspiração em jogos. No caso destas abordagens à gamificação, podemos imaginar que esta teria um final definido, quando o processo de transformação do objeto anteriormente desprovido de jogo atingisse o seu término.

A gamificação pode também ser vista de um ponto de vista instrumentalista, como uma tecnologia que tenta promover a motivação intrínseca dos indivíduos para desempenhar uma determinada atividade, utilizando para isso características de jogo, nomeadamente interação social (Hamari & Koivisto, 2015).

Nacke & Deterding (2017) seguem uma abordagem semelhante, ao definir a gamificação como o uso de elementos de jogo como pontuações e distintivos para promover a atividade dos utilizadores.

Também Kasurinen & Knutas (2018) adotam esta perspetiva instrumentalizadora ao definir gamificação como o uso de elementos de jogo para aumentar e manter a participação de utilizadores de um determinado sistema.

Aos elementos de jogo Rodrigues, Oliveira, & Rodrigues (2019) chamam camadas de jogo, as quais são adicionadas a diversos artefactos como campanhas online, e-learnings, e-business ou e-commerce, de forma a levar os indivíduos a desempenhar uma determinada tarefa ou a encorajar um determinado comportamento desejável.

Crucial na definição de gamificação é a sua diferenciação teórica do conceito de "jogo sério", anteriormente referido neste texto. (Landers, 2014) A distinção é bastante clara se tivermos em mente a aplicação de jogos para efeitos de aprendizagem: os "jogos sérios" possuem matéria que se pretende transmitir, causam aprendizagem em si, sendo que o jogo atua como professor por conter informação. De forma diferente, a gamificação trata de influenciar os comportamentos e atitudes do indivíduo que está a aprender, procurando obter o seu envolvimento e interesse; estes comportamentos e atitudes é que, por sua vez, têm um impacto no processo de aprendizagem, embora não estejam a ensinar *per se* (Landers, 2014).

Outra importante distinção deve ser feita entre gamificação e "jogos penetrantes", que definimos acima de acordo com Deterding, *et al* (2011) como aqueles que contém características de jogo que expandem a jogabilidade a outras esferas.

Mais ainda, importa destrinçar que a gamificação não se limita a ser a utilização de um jogo para uma finalidade "séria"; Deterding (2011) e Landers (2014) clarificam que a gamificação se trata da aplicação de elementos de jogo, conforme a primeira definição que apresentámos, que são depois aplicados isoladamente ou em conjunto a um outro contexto pré-existente e que se pretende gamificar.

Estas três distinções importantes são explicitadas nas Figuras 3 e 4.

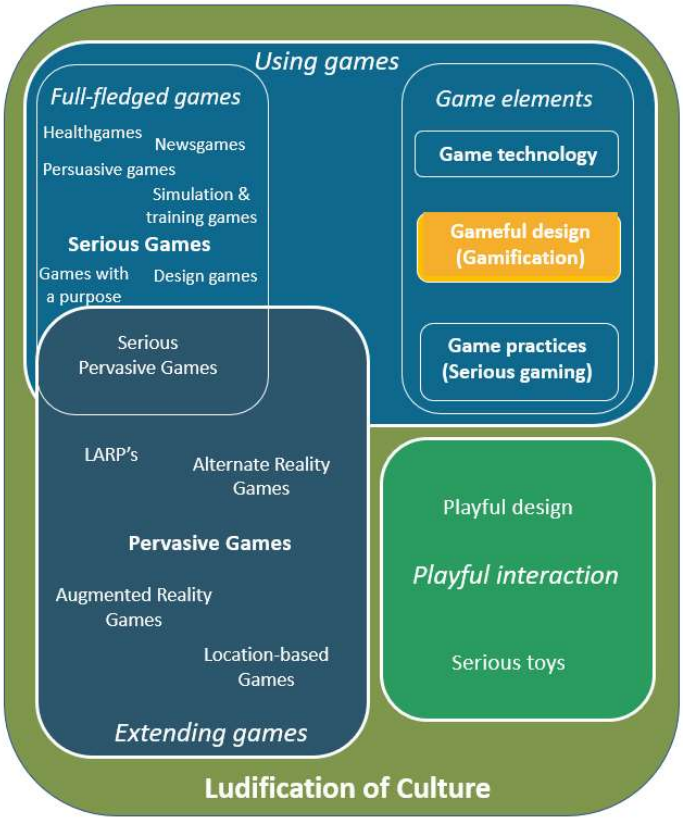

Figura 3 - Situando a gamificação (Deterding et al, 2011)

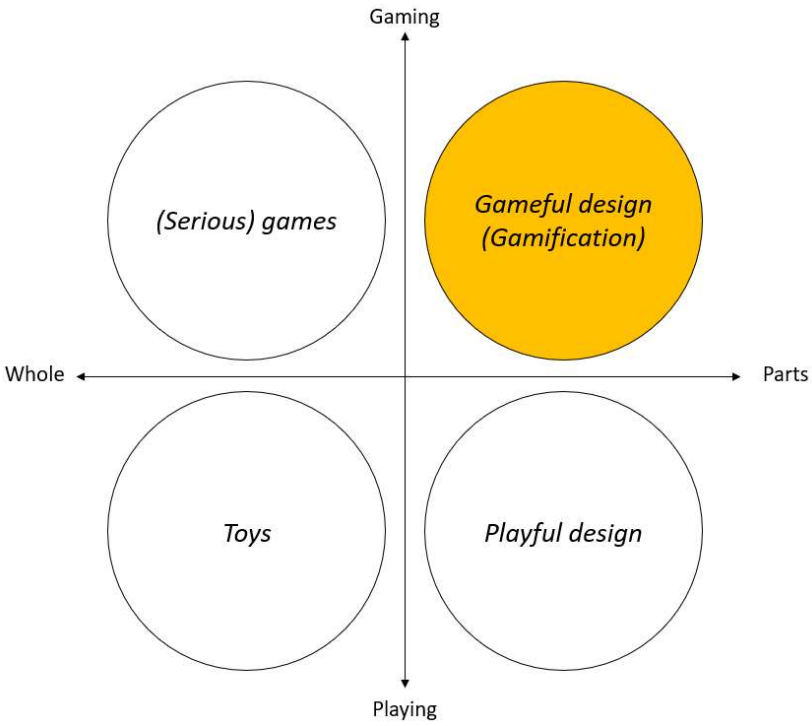

Figura 4 - Gamificação entre jogo e brincadeira, as partes e o todo (Deterding et al., 2011)

Dentro da definição de gamificação de Deterding, et al (2011) – "*use of elements of game design in non-game contexts*" - que a considera um grupo de fenómenos até à data não especificados, importa também a desconstrução que o autor faz do próprio conceito. Enquanto jogo, entende-se o mecanismo possuidor de regras que gera competição entre os participantes no sentido da prossecução de uma determinada finalidade. Os elementos, neste caso, referem-se ao isolamento de características de jogo como sejam os objetivos ou as regras, cuja aplicação isolada ou concatenada sublinham a separação do conceito de "jogo sério". O vocábulo *design* é usado em contraponto aos conceitos de prática ou tecnologia, para incluir fatores relacionados com a própria interface de jogo, como os níveis, quadros de liderança, distintivos e outros de maior nível de abstração como por exemplo a própria mecânica do jogo. Por fim, o conceito de "contexto de não-jogo" refere-se a propósitos distintos do puro entretenimento (Deterding, et al, 2011).

2.1.3. Áreas de aplicação e estudos empíricos

Numa primeira fase de descoberta e experimentação das potencialidades da gamificação, multiplicaram-se os estudos empíricos e estudos de caso. Estes estudos espalham-se um pouco por várias áreas do conhecimento, incluindo saúde, psicologia, marketing, crowdsourcing, finanças e gestão. Porém, os estudos sobre aplicações à área de educação e aprendizagem online – nomeadamente dos Massive Online Open Courses ou MOOC's – e do desenvolvimento de protótipos de artefactos e sistemas que apliquem alguma forma de gamificação, são os mais proeminentes (Kasurinen & Knutas, 2018).

Os estudos acerca da aplicabilidade da gamificação – proof-of-concept – aparecem, aliás, em terceiro lugar na lista de tendências de investigação (Kasurinen & Knutas, 2018).

Nesta área, apresentam-se como exemplos os seguintes trabalhos de investigação:

- Dominguéz et al (2013) desenharam um plugin para uma plataforma de cursos superiores online e utilizaram-no para recolher dados de um curso universitário, tendo concluído que os alunos utilizadores do curso gamificado demonstraram um maior nível de motivação inicial e obtiveram melhores resultados gerais, mas piores resultados em trabalhos escritos assim como em participação nas aulas.
- Hanus & Fox (2015) realizaram um estudo longitudinal sobre o efeito da motivação intrínseca, das comparações, do esforço, da satisfação e da

performance académica num curso de 16 semanas, denotando que os alunos no curso gamificado mostraram menores níveis de satisfação e motivação no longo prazo, do que os restantes. O estudo conclui que que a aplicação de mecânicas gamificadas à educação deve ser feita com cautela.

- Landers & Armstrong (2017) testaram o modelo TETEM – Technology-Enchanced Training Efectiveness Model – em contexto de gamificação. Os resultados deste estudo mostraram que apenas alunos com mais experiência retiraram maior proveito do modelo gamificado, ao passo que os menos experientes retiraram menor proveito que de outros métodos de aprendizagem, levando à conclusão de que a gamificação apenas pode ser bem-sucedida num contexto de utilizadores experientes com uma determinada predisposição.
- Piteira, Costa, & Aparicio (2018) estudaram o melhor modo de introduzir gamificação no ensino de programação online, apresentando um modelo condutor que professores possam utilizar na produção de cursos semelhante, o qual leva em consideração fatores como os objetivos, a audiência e as personalidades.
- Ortega-Arranz et al. (2019) estudaram o comportamento dos alunos de MOOCs face à obtenção de distintivos, concluindo que as suas atitudes eram geralmente positivas. Os alunos confirmaram um efeito positivo da utilização de distintivos sobre a sua motivação, além de um maior grau de envolvimento.

Noutras áreas de conhecimento às quais se estudou a aplicação de gamificação, apontamos os seguintes trabalhos de investigação:

- Gatautis, Vitkauskaite, Gadeikiene, & Piligrimiene (2016) estudaram a gamificação do ponto de vista do comportamento dos consumidores, analisando diferentes modelos de consumo online.
- Rodrigues, Costa, & Oliveira (2016) propõem uma estrutura para o software gamificado na área de e-banking que descreve as principais características que devem ser tidas em conta para a construção de aplicações de e-banking gamificadas.
- Leclercq, Hammedi, & Poncin (2018) estudam os riscos relacionados com a perda de um desadio no contexto de comunidades de co-criação. Os resultados obtidos sugerem que a perda de um desafio tem impactos negativos na experiência do consumidor, os quais podem ser moderados pelos níveis de envolvimento do consumidor com a comunidade a priori.

2.1.4. Motivação do indivíduo e eficácia da gamificação

Uma questão que surge ao pensar em gamificação é a da eficácia da sua utilização. Encontram-se vários estudos empíricos nos quais se faz a avaliação da eficácia de implementações pontuais de artefactos gamificados, como por exemplo Queirós & Pinto (2016) Landers & Armstrong (2017), Lindberg, Laine, & Haaranen (2018) Orhan Göksün & Gürsoy (2019), Pereira, Oliveira, Vieira, Lima, & Paes (2018) ou Yildirim (2017).

Numa perspetiva mais transversal acerca da eficácia destaca-se, porém, o trabalho desenvolvido por Kappen & Nacke (2013) sobre o conceito de gamificação eficaz.

A gamificação eficaz é definida por estes autores como aquela que influencia o comportamento humano através de experiências envolventes, usando princípios de design em aplicações de apoio à decisão e serviços (Kappen & Nacke, 2013). Ou seja, gamificar de forma eficiente significa que se verificará, como resultado, uma alteração observável no comportamento dos utilizadores.

Para atingir este propósito de alteração de comportamentos, Kappen & Nacke (2013) definem um conjunto de elementos necessários. A gamificação eficaz está, segundo esta proposta, envolta num caleidoscópio de conceitos que se organizam em camadas sequenciais como mostra a Figura 5.

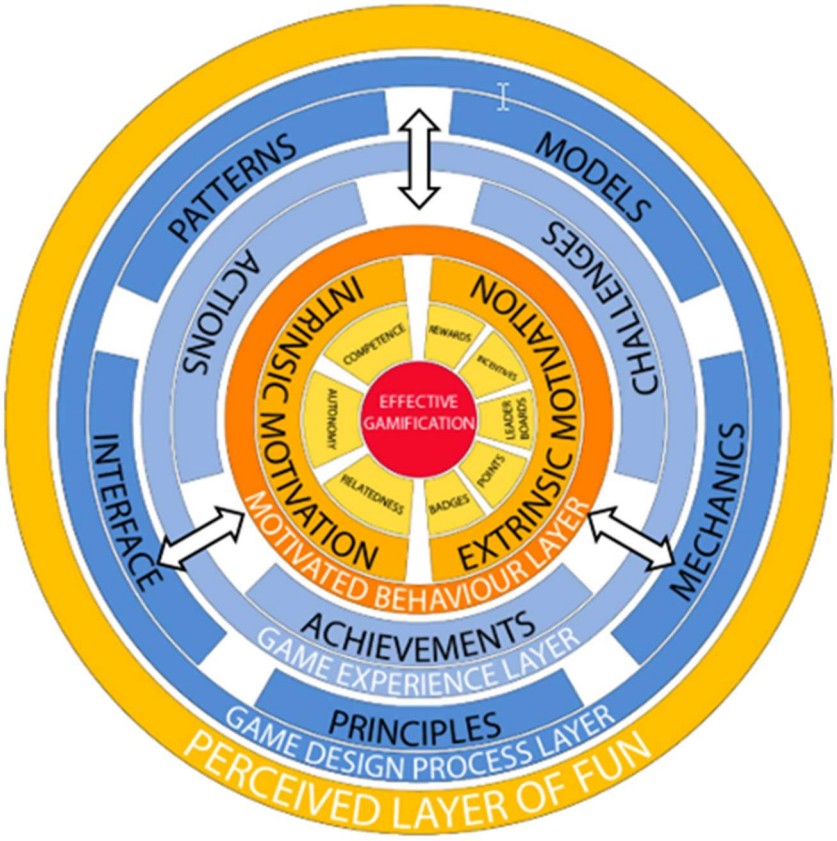

Figura 5 - Caleidoscópio da gamificação eficaz (Kappen & Nacke, 2013)

Nesta conceptualização concêntrica, a gamificação eficaz está envolta por quatro camadas, sendo a mais externa constituída pela perceção de divertimento pelo utilizador. Imediatamente abaixo desta camada de diversão, encontramos o *design* do processo do jogo, formado pelos princípios do jogo, a sua mecânica, a interface, os padrões e os modelos, ou seja, a jogabilidade[3](Deterding et al., 2011).

A terceira camada do modelo de gamificação eficaz é constituída pelas experiências de jogo, ou seja, as acções, desafios e metas atingidas pelo utilizador na situação gamificada.

Junto ao núcleo do modelo, encontramos a camada do comportamento motivado. Aqui, Kappen & Nacke (2013) incluem os elementos-chave da motivação extrínseca – os pontos, quadros de pontuação, recompensas e incentivos – assim como os elementos-chave da motivação intrínseca – autonomia, competência e afinidade. A motivação é, então, um fator necessário à eficácia da gamificação.

[3] *Gamefulness* no original.

Segundo a teoria da auto-determinação de Deci & Ryan (2008) - *self determination theory* ou SDT – a motivação pode ser compreendida como um conjunto de dois elementos: a motivação intrínseca e a motivação extrínseca. A primeira, intimamente relacionada com os valores do indivíduo e alimentada pela ambição pessoal e pela busca de prazer, depende de três necessidades psicológicas do indivíduo, mediadoras da motivação: a procura de competências, o desejo de relacionamento com os outros e o desejo de autonomia (Kam & Umar, 2018). Já a motivação extrínseca está ligada com estímulos externos ao indivíduo.

Assim sendo, não é apenas o prazer percecionado pelo indivíduo quando em situação de gamificação ou ao utilizar artefactos gamificados, que contribui para a sua motivação. Ao mesmo tempo, há que considerar a capacidade que o sistema gamificado tem de fazer o indivíduo sentir-se valorizado ao interagir com outros, ao tomar decisões e ao atingir objetivos (Kam & Umar, 2018).

Também as conquistas do indivíduo estão subjacentes às suas necessidades psicológicas, neste caso à de competência, e impactam positivamente a persistência dos indivíduos na execução de uma tarefa. Esta noção é suportada pela teoria do estabelecimento de objetivos – *goal-setting theory* - enunciada por Locke em 1968. Segundo esta teoria, um indivíduo tenderá a sentir-se motivado para executar uma tarefa quando possui um determinado fim que pretende atingir.

O uso de elementos de gamificação motivadores extrínsecos como por exemplo quadros de pontuação é crucial na definição de metas como método de aumento de *performance* (Landers, Bauer, & Callan, 2017), embora tenha sido provado que não são suficientes por si só (Mekler, Br, Opwis, & Tuch, 2013).

A eficácia do uso da gamificação, entendida como a capacidade de influenciar o comportamento humano, resulta, de acordo com o modelo de Kappen & Nacke (2013), de uma combinação entre fatores intrínsecos - como a motivação do indivíduo em relação àquele comportamento - e o uso de elementos de jogo que conferem uma perceção de prazer e diversão.

Assim, o caleidoscópio da gamificação eficaz (Kappen & Nacke, 2013) sugere uma íntima ligação entre a eficácia da gamificação com a motivação intrínseca do indivíduo e com a motivação extrínseca proveniente do contexto gamificado. Mais ainda, sugere que a conjugação das duas é vital à gamificação eficaz.

Mas a motivação intrínseca e a motivação extrínseca não coexistem de forma perfeitamente estanque, de acordo com a teoria da auto-determinação. Pelo contrário, o indivíduo pode converter motivação extrínseca em motivação intrínseca, caso internalize os seus pressupostos (Seaborn & Fels, 2015), reforçando ainda mais a simbiose entre ambos os tipos de motivação.

Com o recurso a elementos como os pontos, *badges* e quadros de liderança, os sistemas gamificados proporcionam motivação extrínseca para a execução de uma determinada tarefa através dos seus elementos base. Porém, será na internalização destes incentivos e na sua transformação em motivação intrínseca que se dá a alteração de comportamentos e atitudes que está subjacente ao próprio conceito de gamificação.

Associada a esta ideia, aliás, poderá vir também a ligação da gamificação à noção de condicionamento comportamental, da qual advém do seu potencial para produzir alterações do comportamento (Alsawaier, 2018).

2.2.Críticas à gamificação e tendências de investigação

Se a gamificação é eficaz quando influencia com sucesso o comportamento do indivíduo (Kappen & Nacke, 2013), podemos considerar duas perspetivas negativas acerca da gamificação: a gamificação ineficaz, vazia, que não produz qualquer efeito, e a gamificação que produz efeitos nefastos.

No entanto, uma revisão do estado da arte até final de 2019 demonstra que a maior parte das conclusões dos estudos sobre a gamificação são tendencialmente positivas e favoráveis à sua utilização, sendo os seus impactos positivos por vezes tomados como uma certeza (Diefenbach & Müssig, 2019). É aparente a falta de estudos primários e secundários focados nos efeitos negativos que possam advir da gamificação (Toda, Valle & Isotani, 2018).

No entanto, existe uma grande quantidade de resultados mistos em estudos empíricos. Isto é, são apontados casos em que as tentativas de gamificar não funcionaram tão bem, mas no contexto de estudos com resultados gerais positivos, o que poderá ser explicado pelo grau de novidade da temática da gamificação (Koivisto & Hamari, 2019).

A possibilidade de haver um efeito de novidade nos estudos sobre gamificação já tinha sido apresentada pelas mesmas autoras em 2014, ao descobrir que os efeitos de satisfação tendem a desvanecer ao longo do tempo " (…)*enjoyment, and playfulness tend to diminish with time using the service, suggesting that gamification could have some novelty value causing perceptions of usefulness and enjoyment to be higher in the beginning and to fade the longer the user continues using the service*" (Koivisto & Hamari, 2014).

Não obstante a aparente generalidade de atitudes positivas por parte dos investigadores, existe quem expresse a necessidade de investigações mais aprofundadas sobre o assunto, sugerindo que o uso e aplicação de gamificação conduz a uma dicotomia entre benefícios e preocupações (Brigham, 2015).

Outros autores consideram necessária a investigação mais aprofundada e reportam reservas face ao conceito ou à sua aplicação. Nestes estudos, são apontados motivos éticos ou relacionados com a heterogeneidade de resultados obtidos pelos estudos empíricos realizados, dos quais alguns sugerem até a diluição dos efeitos positivos da adoção de gamificação.

Dentro da categoria de estudos que apontam ineficácia da gamificação, encontramos aqueles que apontam a diminuição do entusiasmo e da motivação dos indivíduos em

situação gamificada, com impactos negativos na participação (Kam & Umar, 2018). É também apontada, em situações de gamificação, a diminuição da *performance* ao longo do tempo (Toda, Valle & Isotani, 2018).

Outros estudos reportam a inexistência diferenças observáveis no comportamento dos indivíduos em situação com uso de elementos gamificados em comparação a uma situação de controlo, como é o caso de Auvinen, Hakulinen, & Malmi (2015).

Outra das principais preocupações expressas pela comunidade científica prende-se com a incorreta definição do conceito de gamificação e com a indevida utilização da mesma. Landers (2019) refere-se ao conceito de retórica da gamificação, também já mencionado por Deterding (2015), e que consiste na adição de elementos de jogo arbitrariamente sem uma razão legítima que o suporte, apenas para tornar algo semelhante a um jogo.

A sobre-simplificação da gamificação pode ainda levar ao fenómeno de "pointsification" como denominado por Robertson (2010), que consiste na aplicação irrefletida de sistemas de pontuação.

Cassone (2017) expressa também preocupação com a indefinição do termo "gamificação", assim como a possibilidade de serem usadas definições e mecânicas de jogo demasiado simples, levando ao risco da retorização da gamificação.

Questões sobre a eficácia do uso da gamificação, apontadas por Hamari, Koivisto & Sarsa (2014) mas também por Hyrynsalmi & Smed (2017) relativamente a resultados obtidos em estudos empíricos, sugerem a coexistência de vantagens e desvantagens resultantes da utilização de elementos gamificados em determinados contextos e abre a porta para a possibilidade de existência de um limite determinável para o conteúdo gamificado.

Hyrynsalmi, Smed & Kimpa (2017) vão mais longe, e incluem-se na categoria de estudos que exploram a possibilidade de existirem efeitos nefastos da gamificação. É apontada a possibilidade da aplicação de gamificação poder conduzir ao mesmo tipo de questões éticas que os jogos suscitam não apenas na possibilidade de serem usados para exploração dos indivíduos, mas também no que diz respeito à sua aplicação a contextos em que os utilizadores sejam menores de idade ou tenham um historial de adição ao jogo.

Na mesma linha surge um dos críticos mais ferozes da gamificação, Iain Bogost. Além de caracterizar a gamificação como uma "treta" no título de um dos seus textos[4] em 2013, Bogost utiliza a expressão "*exploitationware*", cuja tradução à letra resultaria em algo com conotação semelhante a "arma de exploração". Bogost (2013) afirma que os incentivos providenciados pelo uso da gamificação no mundo do trabalho são irreais promovendo a exploração e defendendo o uso de incentivos materiais como condição para o estabelecimento de relações de confiança entre empregador e empregado "*Real incentives come at a cost but provide value for both parties based on a relationship of trust.*" (Bogost,2013).

Ainda Cassone (2016) reporta preocupações acerca de potenciais efeitos indesejados da aplicação de gamificação no mundo do trabalho, podendo resultar em conflitos e paradoxos. Uma vez que a gamificação se destina à alteração de atitudes e comportamentos, pode ser usada para efeitos de promoção de comportamentos desejáveis no local de trabalho, como seja a maximização da produção. Este fator coloca a aplicação de gamificação no âmbito do trabalho sob escrutínio, uma vez que corre o risco de ser aplicada com propósitos ambíguos do ponto de vista ético ou legal.

Porém, tem sido pouca a atenção dada às implicações morais e éticas da gamificação, como alertam Kim & Werbach, 2016. Os autores revêem a gamificação à luz das quatro grandes áreas da moral – exploração, manipulação, danos físicos e psicológicos e caráter – concluindo que o seu impacto não é determinado pela gamificação em si, mas pelas pessoas envolvidas.

Resultados positivos obtidos nos estudos empíricos são também, muitas vezes, circunstanciais. Ou seja, os benefícios reportados são dependentes do contexto no qual o estudo se desenrola e dos elementos que foram usados para gamificar (Kam & Umar, 2018).

Outra das grandes críticas à gamificação que surge na literatura está relacionada com o facto de um conjunto de casos de sucesso não garantirem o sucesso noutras situações, sugerindo que nem em todas as situações é proveitoso gamificar "(…) *not all games are fun and many are not worth playing. The same applies to gamified experiences in organizations* (Robson, Plangger, Kietzmann, McCarthy, & Pitt, 2016).

[4] *Bullshit* no original

Mas, além das críticas à gamificação há um conjunto de autores que preconiza apenas o uso de cautela na aplicação da gamificação.

Brigham (2015) alerta que a gamificação não deve ser aplicada de ânimo leve, uma vez que não é simples desenhar e implementar uma solução gamificada, assim como há que garantir que os seus objetivos são perfeitamente claros e de simples compreensão. Brigham chama ainda a atenção para o facto de existirem elementos da comunidade científica que temem que as estratégias de jogo, aplicadas a contextos de aprendizagem, resultem numa minimização da importância dos objetivos pedagógicos aos olhos dos alunos, fazendo com que estes não levem o curso tão a sério ou não o considerem digno do seu empenho.

A revisão da literatura sobre gamificação realizada por Koivisto & Hamari (2019) procurou reunir as tendências de pesquisa nesta área por forma a compreender qual o estado da investigação e que potenciais caminhos poderão existir para percorrer nos próximos anos por parte dos investigadores. Como principais tendências de investigação sobre gamificação, identificaram-se a educação, a saúde e o *crowdsourcing,* assim como o estudo de elementos como a aplicação distintivos e de níveis.

Koivisto & Hamari (2019) determinaram 15 possíveis trajetórias de investigação, com base naquilo que à data consistia em falhas de conhecimento ou áreas pouco aprofundadas; entre estas, podemos encontrar o apelo à investigação sobre potenciais efeitos negativos: "*Thematic agend 4: Future gamification research should seek to explore the potential negative, adverse or non-preferrable effects of gamification and how to mitigate them*".

Capítulo 3 – Metodologia

3.1. Desenho da investigação

De forma a responder às questões de investigação colocadas no início deste trabalho, "Quais os conceitos associados aos efeitos negativos da gamificação?" e "Quais as limitações da gamificação?", utilizou-se uma metodologia qualitativa dividida em duas fases. Em primeiro lugar, procedeu-se a uma revisão sistemática da literatura (RSL) sobre efeitos negativos da tecnologia. Na segunda fase da investigação, efetuou-se uma segunda RSL acerca de efeitos negativos e limitações da gamificação; por fim submeteu-se a amostra resultante a uma análise de conteúdo através da utilização do software de *text*-mining Leximancer.

3.1.1. Método qualitativo – o uso da RSL

A escolha de uma metodologia qualitativa para este estudo radica na natureza do problema de partida, que consiste na procura de uma maior compreensão dos potenciais efeitos negativos e limitações do uso de gamificação ou artefactos gamificados. A investigação qualitativa está, precisamente, vocacionada para a compreensão de uma determinada temática, em contraste com o objetivo de obter uma explicação para um fenómeno através do teste de hipóteses, que está subjacente aos métodos quantitativos (Berndtsson et al, in Dawson, 2005).

Desta forma, escolhemos a revisão sistemática da literatura para esta investigação. A revisão sistemática da literatura (RSL) é um método de investigação de cariz qualitativo, que tem sido utilizado frequentemente em estudos na área de Sistemas de Informação, quer usando exclusivamente estudos empíricos, quer incluindo também literatura terciária (Kasurinen & Knutas, 2018; Rodrigues, Oliveira, & Rodrigues, 2019; Subhash & Cudney, 2018).

Enquanto técnica de investigação qualitativa, a RSL surge como um método de pesquisa fundamentalmente agregador que permite identificar, avaliar e interpretar um universo alargado de publicações científicas acerca uma determinada temática ou que respondem a uma questão específica. Isto proporciona ao investigador um modo de obter um resumo objetivo da pesquisa previamente feita sobre a mesma (Budgen & Brereton, 2006).

Entre as vantagens do uso da revisão sistemática da literatura (RSL) destaca-se a potencialidade de agregar e resumir (Brereton, Kitchenham, Budgen, Turner, & Khalil, 2007; Budgen, David; Brereton, 2006) experiências de diferentes áreas científicas e de colocar em evidência lacunas do conhecimento, possibilitando um posicionamento do investigador em relação ao assunto (Budgen, David; Brereton, 2006).

A RSL reforça ainda o valor da interdisciplinaridade, sendo considerada um método de utilização fundamental em estudos que pretendam avaliar o estado da arte em várias áreas, mapear diferentes abordagens ao mesmo tema, reunir diferentes perspetivas teóricas, evidenciar contrastes entre os resultados de diferentes métodos de investigação ao serem aplicados à mesma questão de partida e servir de base para meta-análises quantitativas (Burgers, Brugman, & Boeynaems, 2019). Budgen & Brereton (2006) corroboram este último ponto, sublinhando a vantagem do uso da revisão sistemática da literatura (RSL) como pré-requisito para a execução, por exemplo, de uma meta-análise quantitativa.

3.1.2. Análise de conteúdo e CAQDAS

Aliada à revisão sistemática, a análise de conteúdo é o método adequado para a prossecução dos objetivos específicos estabelecidos no início desta investigação, por permitir analisar mais profundamente os textos seleccionados de forma a produzir uma mapa conceptual.

Enquanto método dedutivo, a análise de conteúdo permite ao investigador detetar padrões e particularidades num corpus textual (Rodrigues et al., 2019), possibilitando a identificação de propriedades e assuntos relevantes que emergem de um conjunto de textos (Anagnostopoulos & Bason, 2015).

A análise exaustiva de uma grande quantidade de dados sob a forma de texto pode, no entanto, apresentar desafios quando executada de forma manual. Por um lado, a análise humana está sujeita a subjetividade que tem influência nos processos de decisão e cujo combate requer custos avultados (Smith & Humphreys, 2006) havendo dificuldade em analisar profundamente, de modo manual, grandes quantidades de texto, o que seria uma tarefa morosa (Smith & Humphreys, 2006).

No sentido de colmatar estas duas dificuldades inerentes à análise de conteúdo, Smith e Humphreys (2006) defendem a automação da análise a grandes extensões de dados sob

a forma de texto, mais especificamente com recurso a *software* de *text-mining*, uma vez que torna o processo mais rápido e produz efeitos positivos na sua eficácia ao permitir a extração de conceitos.

O recurso a Computer Assisted Qualitative Data Analysis Software (CAQDAS) para proceder à análise de grandes quantidades de dados sob a forma de texto é também preconizado por autores como Crofts & Bisman (2010) (Hyndman & Pill, 2018), ao permitir uma maior sistematização da análise, logo, uma maior eficiência. Este reforço da eficiência na análise aumenta, por sua vez, o rigor da análise qualitativa (Sinkovics, Penz, & Ghauri, 2008). Além disto, o uso de *software* de análise quantitativa para a produção de uma análise qualitativa, no âmbito de uma investigação qualitativa, amplia a liberdade criativa do investigador na compreensão dos dados (Sinkovics et al., 2008).

3.1.3. Leximancer como ferramenta para análise qualitativa

O Leximancer é um *software* de análise de dados sob a forma de texto que tem sido usado frequentemente na execução de revisões sistemáticas em variadas áreas do conhecimento (Anagnostopoulos & Bason, 2015; Chiu, Bae, & Won, 2017; Penela & Serrasqueiro, 2019; Rodrigues et al., 2019; Tseng, Wu, Morrison, Zhang, & Chen, 2015).

Rodrigues et al (2019) recorrem ao Leximancer para uma análise sistemática de conteúdo que permitiu mapear, para o período entre 2011 e 2016, os principais conceitos e temas subjacentes à gamificação no universo da literatura académica, contribuindo para sistematizar conhecimento numa temática ainda recente, onde abundam os estudos empíricos.

Anagnostopoulos & Bason (2019) utilizam apenas uma fonte de dados textuais, a publicação científica, Sports Management International Journal Choregia, retirados de um período de tempo definido entre 2005 e 2014, para mapear com o Leximancer os principais temas de interesse na área académica da educação física.

Chiu, Bae & Won (2017) utilizaram a ferramenta para analisar um vasto conjunto de comentários na plataforma turística TripAdvisor, de turistas que tivessem assistido a jogos de baseball coreanos, com o intuito de gerar *insights* acerca do turismo desportivo no país.

Um estudo conduzido por Penela & Sarrasqueiro (2019) utilizou os relatórios de risco produzidos por empresas do setor do turismo, mais especificamente de hospedagem, de dois anos específicos: 2008, no pico da crise económica, e 2016, na época de recuperação da economia. Após a aplicação do Leximancer a estes dados textuais, os investigadores puderam detetar e comprar os principais temas de risco que preocupavam este setor em específico em cada uma destas épocas.

Tseng, Wu, Morrison & Chang (2015) utilizaram o Leximancer para analisar o conteúdo de blogs sobre viagens que tivessem conteúdo sobre a China, como fonte de electronic *word-of-mouth* (e-WOM), de modo a aferir a imagem que os turistas estrangeiros têm do país.

Ao tratar-se de uma ferramenta de *text-mining* – de aprendizagem não supervisionada (Smith & Humphreys, 2006) – o Leximancer utiliza algoritmos estatísticos de forma a produzir mapas de conceitos (Anagnostopoulos & Bason, 2015). Para isto, o software mede a frequência de palavras, a co-ocorrência de termos, e identifica relações entre conceitos, através de dados de texto em liguagem natural (Anagnostopoulos & Bason, 2015; Rodrigues et al., 2019). Em suma, o Leximancer utiliza métodos quantitativos para produzir uma análise qualitativa rigorosa, completa com representação gráfica dos resultados (Anagnostopoulos & Bason, 2015).

A ferramenta analisa um corpo de texto registando a frequência das palavras, assim como a sua co-ocorrência e relações entre estas, através do que faz a identificação conceitos (Smith & Humphreys, 2006). Seguidamente, constrói um vocabulário[5] através dos conceitos identificados, ao agrupar termos que estejam semanticamente relacionados e sejam co-ocorrentes e apresenta, como resultado, um conjunto de conceitos agregadores de conceitos, que denominamos temas (Smith & Humphreys, 2006).

[5] *Thesaurus* no original

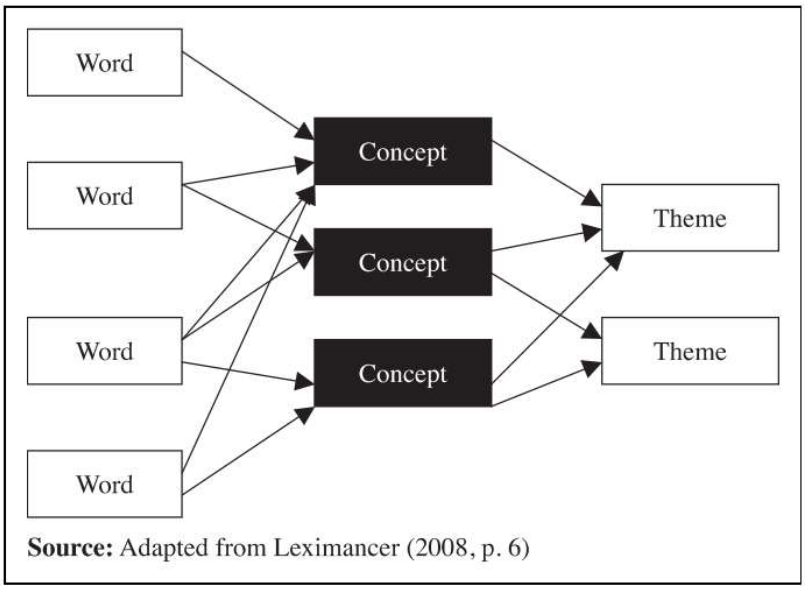

Figura 6 - Modelo de análise do Leximancer (Hyndman & Pill, 2018)

Entre as vantagens da utilização do Leximancer para a análise de dados sob a forma de texto, uma das mais mencionadas na literatura é a sua capacidade de processar uma grande quantidade de dados (Rodrigues et al., 2019; Smith, 2003). Além disso, a funcionalidade de apresentação de resultados sob o formato de gráficos, que tornam mais simples a leitura através do uso de tamanho, cor e intensidade para traduzir relações entre termos (Anagnostopoulos & Bason, 2015; Hyndman & Pill, 2018). A representação gráfica permite que os dados gerados por uma análise feita através do Leximancer sejam usados não só para identificar conceitos / temas emergentes dentro da temática, como relações de associação e proximidade entre estes. Smith (2003) aponta ainda que uma análise feita com uso de uma ferramenta de aprendizagem não-supervisionada, como é o Leximancer, tende a gerar conceitos bem definidos, o que contribui para a robustez dos resultados.

Os conceitos identificados pelo Leximancer agrupam-se, nos gráficos de resultados, em círculos coloridos cuja intensidade de cor denota a força da presença desse tema (Rodrigues et al., 2019). A própria cor dos círculos que representam os temas e o seu tamanho relativo têm, também, significado: círculos com cores mais vivas representam uma maior presença daquele tema nos dados analisados (Anagnostopoulos & Bason, 2015). Numa analogia ao espetro da luz visível, os temas mais importantes são representados por círculos de cor vermelha, ao passo que os círculos de cor roxa

identificam os temas menos importantes, ou seja, com menor ocorrência no conjunto de dados (Anagnostopoulos & Bason, 2015).

3.2. Protocolo de investigação

O uso rigoroso de um protocolo de investigação bem definido que permita identificar a maior quantidade possível de material relevante e que possua critérios bem definidos de inclusão e de exclusão confere robustez a uma RSL (Budgen, David; Brereton, 2006). Assim, a investigação que levámos a cabo foi dividida em duas fases sequenciais.

3.2.1. Fase 1

Numa primeira fase da investigação , pretendeu comprovar-se a sustentabilidade e relevância científica do tema central deste estudo, o mapeamento de perspetivas sobre efeitos negativos e limitações da gamificação.

Confirmada a aplicabilidade do HypeCycle da Gartner partindo do pressuposto de O'Leary (2008) de que certos tipos de investigação tendem a surgir em determinadas fases do ciclo de vida de uma tecnologia emergente, pode assumir-se que existe, a um dado ponto na evolução de uma tecnologia, uma fase na qual a comunidade científica se preocupa com possíveis falhas e limitações da mesma, com os seus possíveis efeitos contraproducentes e até com efeitos nocivos ou indesejados que essa tecnologia pode ter nos indivíduos que a utilizam em diversos contextos.

Para tal, foi pertinente comprovar se tem existido ou não preocupação, da parte da comunidade científica, acerca de potenciais efeitos negativos da tecnologia. Considerou-se a existência de preocupação pode ser apreciada de acordo com a presença, em artigos científicos, de considerações sobre potenciais efeitos negativos da tecnologia.

Seguiu-se, então, a seleção de um conjunto de termos-chave – em língua inglesa, de forma aumentar o leque de resultados - para efetuar pesquisa online de artigos:

- "negative effects" OR "negative impacts" OR "harmful effects" OR "counterproductive effects" AND "technology" OR "gamification" OR "games" OR "social media"; "technostress";
- "dark" OR "dark side" AND "technology" OR "gamification" OR "social media";
- "dark web";
- "dark side" AND "web".

Utilizando estas palavras-chave, efetuou-se uma pesquisa exaustiva de textos publicados, utilizando as seguiontes plataformas de conteúdo científico online:

- Google scholar;

- EDS;
- Scopus;
- Web Of Science;
- B-On.

O resultado desta pesquisa foi um primeiro conjunto de textos aos quais foi feita uma revisão de âmbito, citações e bibliografia utilizada, conforme o aconselhado por Webster e Watson (2002) na elaboração de uma revisão sistemática, o que resultou num segundo conjunto de textos.

Seguidamente, este segundo conjunto de textos foi filtrado de modo a manter maioritariamente artigos publicados em revistas científicas - apenas dois textos compilados pertencem a publicações no âmbito de conferências científicas internacionais e foram mantidos no conjunto pela sua relevância para a temática e por conferirem diversidade às áreas científicas representadas.

Por fim, todos os textos foram sujeitos a um critério de exclusão relacionado com o *ranking* da publicação científica em que foram publicados: apenas artigos de revistas pertencentes a um nível Q2 ou superior foram mantidos.

Uma esquematização da primeira fase do protocolo de investigação pode ser encontrado na Figura 7.

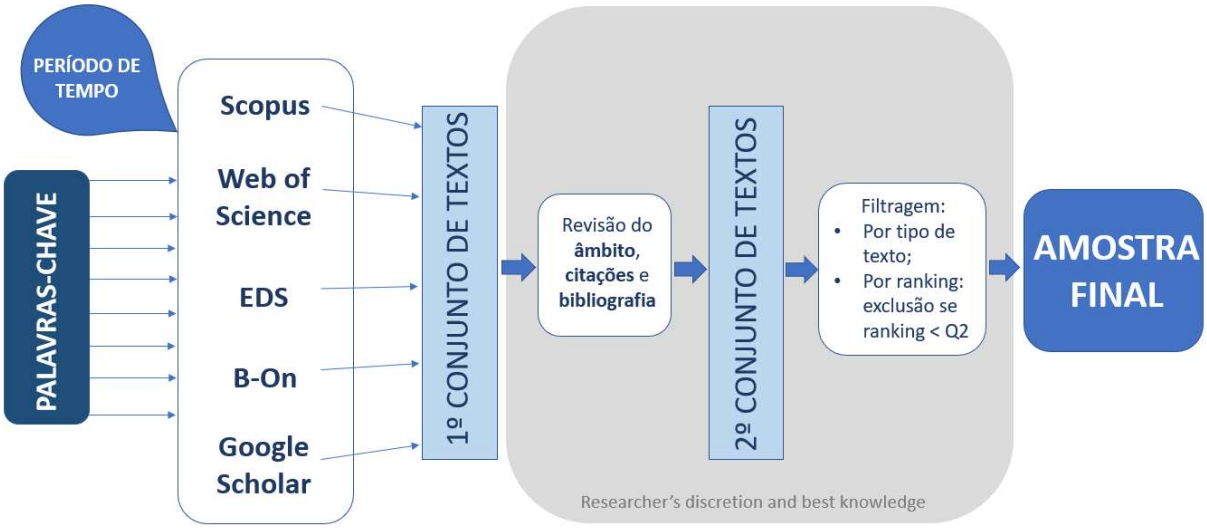

Figura 7 – Esquema do protocolo de investigação – Fase 1

3.2.2. Fase 2

Na fase seguinte desta investigação realizamos de uma nova pesquisa de literatura, desta vez apenas nas plataformas Web Of Science e Scopus, com um conjunto de palavras-chave relacionadas com aspetos negativos da gamificação:

- "dark side" AND "gamification";
- "dark" AND "side" AND "gamification";
- "dark" AND "gamification";
- "dark side" AND "gamification";
- "negative impacts" AND "gamification";
- "negative effects" AND "gamification";
- "harmful impacts" AND "gamification";
- "harmful effects" AND "gamification";
- "counterproductive impacts" AND "gamification";
- "counterproductive effects" AND "gamification";
- "technostress" AND "gamification";
- "ethics" AND "gamification";
- "addiction" AND "gamification".

Na pesquisa efetuada nesta fase, foram colocadas as seguintes restrições a priori:

- Tipo de publicação = artigo científico;

- Língua de publicação = Inglês;
- Ano de publicação ≥2004 .

Após a obtenção do primeiro conjunto de textos resultantes deste passo, foi feita uma revisão de âmbito, citações e bibliografia, após o que se obteve o segundo conjunto de textos.

No passo seguinte, o conjunto de textos foi filtrado de acordo com o ranking da publicação no qual foi publicado: apenas artigos de revistas científicas com um ranking ≥ Q2 no ano de publicação foram mantidos para a amostra final.

Com base nesta amostra, foi construída uma tabela (Anexo B) que sistematiza os títulos, ano de publicação, autores e abstracts dos textos resultantes dos passos acima descritos.

Por fim, os *abstracts* foram inseridos no Leximancer para obtenção dos temas e conceitos subjacentes a esta temática. A representação gráfica do protocolo para Fase 2 da investigação pode ser encontrada na Figura 8.

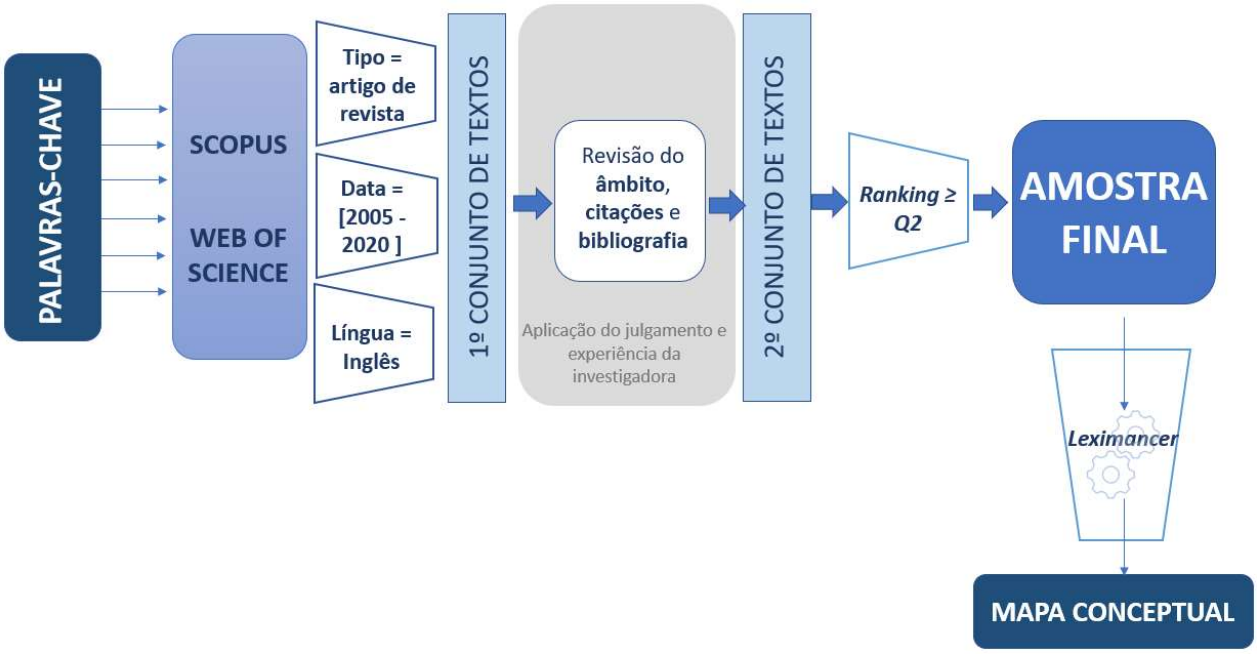

Figura 8 - Esquema do protocolo de investigação – Fase 2

3.2.3. Definição de âmbito e critérios de inclusão / exclusão

O estabelecimento de limites – temporais, de *ranking*, de língua, de tipo de publicação – aos dados que escolhemos submeter à análise de conteúdo efetuada pelo Leximancer é

relevante no sentido da firme definição daquele que é o âmbito do estudo. A definição rigorosa do âmbito é, aliás, de extrema importância para evitar a deriva de foco no decurso da investigação – "*A content analysis can turn into an unbound study if the goal and scope of the investigation are not clear* (…)" (Rodrigues et al., 2019, p.4).

Assim definiu-se, em primeiro lugar, a janela temporal para a publicação dos artigos escolhidos para este estudo, de forma a ter uma perspetiva abrangente. A delimitação do período de publicação para cada um dos conjunto de textos pretendeu conferir robustez aos resultados da revisão sistemática da literatura de acordo com Budgen, et al (2006) ao criar um critério de inclusão inequívoco. A escolha do limite inferior do período de tempo utilizado deveu-se ao facto de o conceito de gamificação ter a sua génese no início da década de 2010, porém possuir raízes prévias; assim, determinou-se 2005 com o intuito de apanhar artigos que estivessem na base do conceito.

A escolha da língua inglesa relaciona-se com o facto de a maior parte dos artigos científicos serem escritos nesta língua por se destinarem a uma comunidade académica internacional.

O tipo de textos escolhido para esta investigação – principalmente artigos científicos na Fase 1 e exclusivamente artigos científicos na Fase 2 – segue as orientações de Webster & Watson (2002) para a execução de revisões sistemáticas da literatura na área de Sistemas de Informação. De acordo com estas, o mais provável é que as contribuições de maior importância sejam publicadas em revistas de topo: em suma, a relevância do texto e o peso da sua contribuição são tanto maiores quanto mais importante for a publicação em que se insere (Webster J. & Watson, 2002).

Os mesmos autores recomendam ainda que, ao procurar desenvolver conceitos teóricos através da revisão sistemática da literatura (RSL), sejam considerados textos de várias àreas científicas, de modo a ser coerente com a interdisciplinaridade inerente à própria investigação em Sistemas de Informação.

O passo deste protocolo de investigação no qual são revistos não só o âmbito, mas também citações e referências bibliográficas, baseia-se nas mesmas orientações, segundo as quais se deve olhar para o passado e para o futuro de cada texto de modo a garantir uma revisão compreensiva do universo de literatura científica sobre o tema. "*Of course, you will miss some articles. If these are critical to the review, however, they are likely to*

be identified by colleagues who read your paper either prior to or after your submission." (Webster J. & Watson, 2002).

Capítulo 4 – Análise e discussão dos resultados

4.1. Resultados da Fase 1

A amostra final recolhida na Fase 1 possui sessenta e seis textos pertencentes a várias áreas de investigação que vão desde a educação à saúde (Anexo A), dos quais 94% foram publicados em revistas científicas, conforme demonstrado na Figura 9.

Figura 9 – Tipos fontes utilizadas na Fase 1 (elaboração própria)

Deste conjunto de textos, quarenta e sete são artigos publicados em revistas científicas classificadas pelo SJR – Scimago Journal and Country Rank - como pertencentes a Q1 e 15 foram publicados em revistas científicas de quartil Q2. Dos restantes artigos constantes na amostra final, três foram publicados em conferências internacionais, e o quarto foi publicado por uma agência governamental dos E.U.A.. A distribuição de artigos por tipo de fonte pode ser vista na Figura 9, ao passo que o número de artigos por quartil ao qual pertence a publicação de origem pode ser consultado na Figura 10.

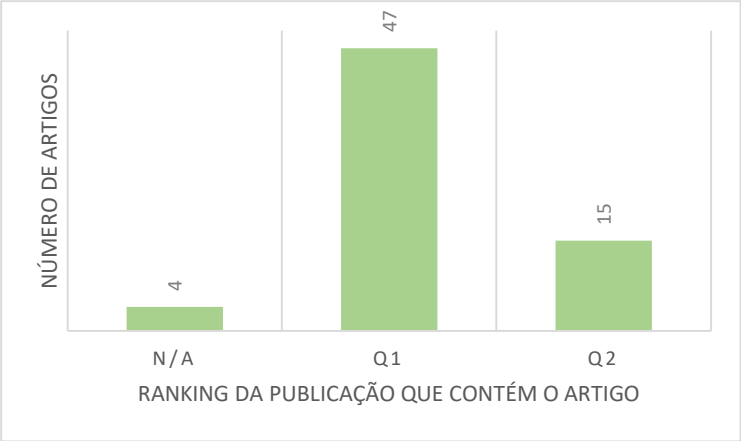

Figura 10 - Contagem de ranking nos artigos da Fase1 (elaboração própria)

Do conjunto de artigos compilados na primeira fase da investigação, importa ainda olhar para o número de items por ano de publicação. Dentro do período definido para a pesquisa de textos, de 2005 a 2020, nota-se que o primeiro artigo considerado na amostra final surge apenas em 2007. O número de artigos por ano aumenta a partir de 2012, sendo o pico atingido em 2018 com quinze artigos, e caindo abruptamente para dois em 2020, como explicitado na Figura 11.

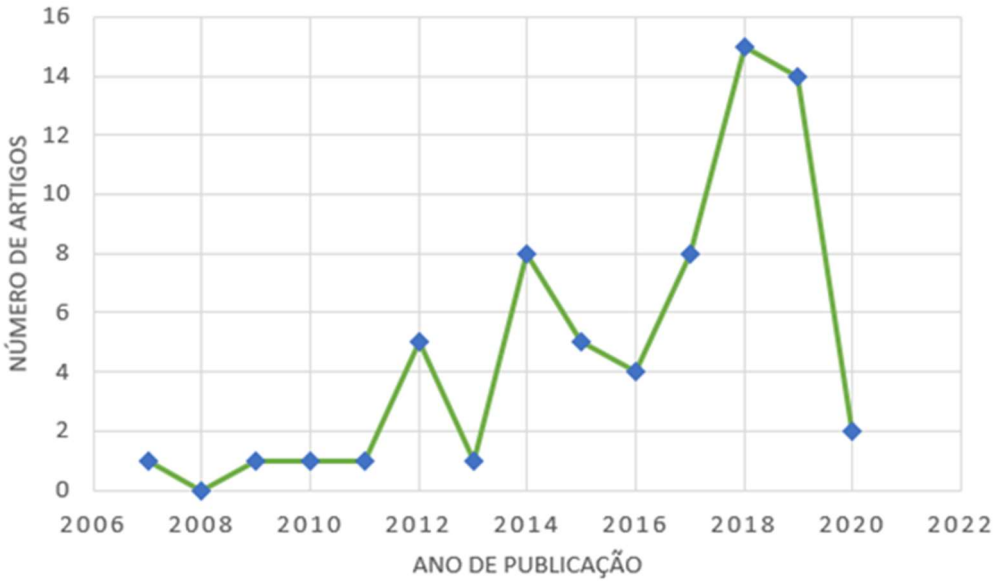

Figura 11 - Número de artigos por ano – Fase 1 (elaboração própria)

4.2. Resultados da Fase 2 – compilação do conjunto de textos

Como resultado do primeiro passo da Fase 2, obtivemos um conjunto final de oitenta e seis artigos que mencionam ou aprofundam o lado negativo da gamificação, desta vez exclusivamente provenientes de revistas científicas.

Os artigos relevantes surgem a partir de 2013, para o conjunto de critérios utilizados na pesquisa, embora esta tenha sido feita para publicações feitas entre 2005 e 2020.

Dos artigos recolhidos, a maior parte foi publicada em 2019, que corresponde a 47,62% dos artigos recolhidos. Verifica-se ainda uma queda abrupta no número de artigos publicados em 2020 que cumpram os critérios de pesquisa.

Figura 12 – Número de artigos por ano – Fase 2 (elaboração própria)

Tabela 1- Número de artigos por ano de publicação – Fase 2 (elaboração própria)

Ano de publicação	Nº	%
2013	1	1,19%
2014	4	4,76%
2015	4	4,76%
2016	10	11,90%
2017	10	11,90%
2018	9	10,71%
2019	40	47,62%
2020	6	7,14%
Total	84	100%

Utilizando o critério de exclusão relacionado com o ranking da publicação do índice SJR – ranking ≥ Q2 – a amostra final é composta exclusivamente de artigos de revistas científicas classificadas como Q2 ou Q1 no ano de publicação do artigo. Deste conjunto, 71% dos artigos pertence a revistas de Q1 no ano de publicação, enquanto que 29% pertencem a revistas de quartil Q2, conforme demostrado na Figura 13.

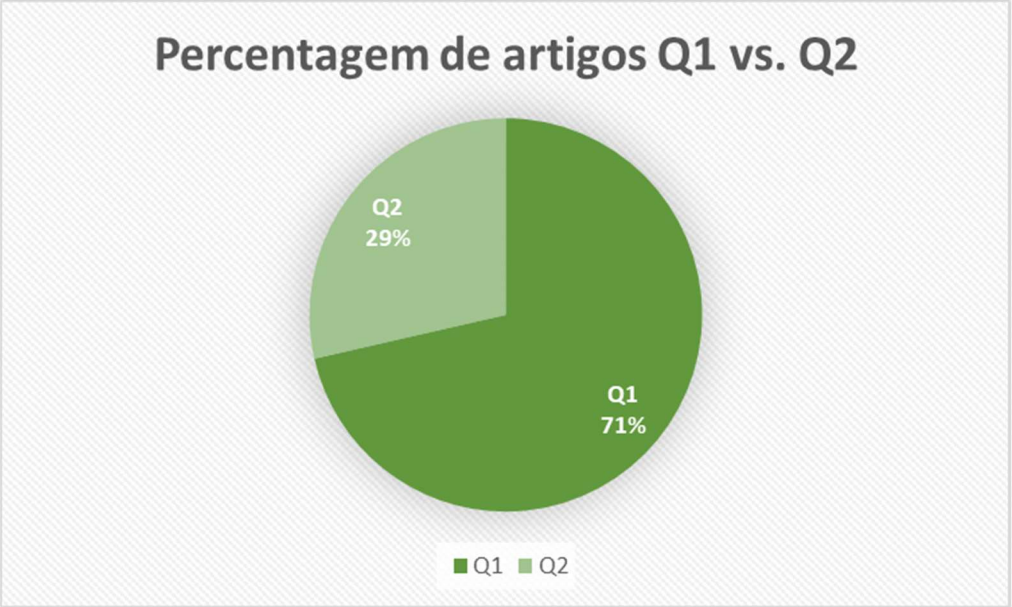

Figura 13 - Percentagem de artigos Q1 vs. Q2 na Fase 2 (elaboração própria)

Numa das publicação da qual foram detetados dois artigos de interesse para este estudo – Games for Health – o ranking da revista mudou do ano de publicação de um artigo para o ano de publicação de outro, pelo que foram considerados como de duas publicações diferentes para efeitos do estudo do ranking.

Os artigos recolhidos foram publicados em revistas científicas de variadas áreas de investigação, incluindo medicina, marketing, educação, enfermagem, ética, gestão e design. Porém, onze publicações forneceram um maior número de artigos contendo referências ou aprofundando potenciais efeitos negativos e limitações da gamificação, correspondendo a 43,02% da amostra. Destas, destacamos as publicações *Computers in Human Behavior*, *International Journal of Human Computer Studies* e *Computers and Education*, cuja soma dos artigos corresponde a 22% da totalidade da amostra conforme mostram a Figura 14 e a Tabela 2.

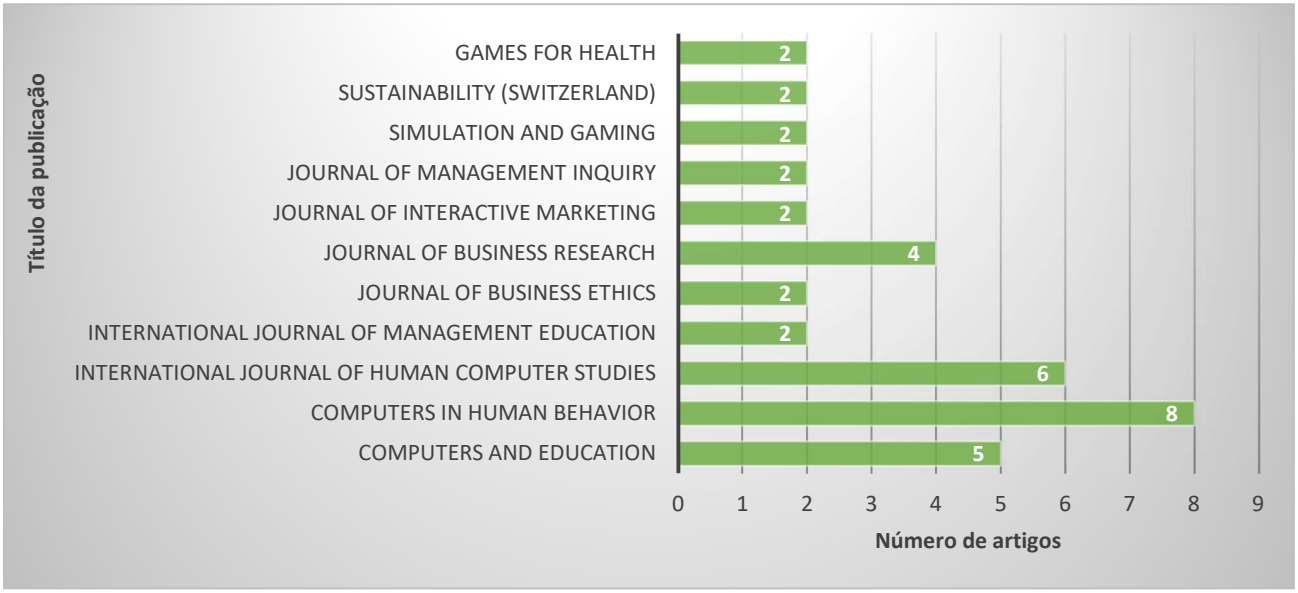

Figura 14 - Publicações com nº artigos > 1- Fase 2 (elaboração própria)

Tabela 2 - Top 3 revistas com maior número de artigos – Fase 2 (elaboração própria)

Publicação	Nº artigos	Q
Computers and Education	5	Q1
Computers in Human Behavior	8	Q1
International Journal of Human Computer Studies	6	Q1

A totalidade das publicações contempladas na amostra de textos recolhida, assim como a sua contribuição para a mesma e o respetivo ranking de acordo com o SJR, podem ser consultada na Tabela 2.

Tabela 3 - Número de artigos por publicação e respetivo quartil – Fase 2 (elaboração própria)

Publicação	Nº	Q
Applied Ontology	1	Q1
Behaviour and Information Technology	1	Q2
Behaviour Research and Therapy	1	Q1
Communications of the Association for Information Systems	1	Q2
Computers and Education	5	Q1
Computers in Human Behavior	8	Q1
Corporate Communications	1	Q2
Current Opinion in Behavioral Sciences	1	Q1
Cyberpsychology	1	Q2
Educational Technology & Society	1	Q1
Energy and Buildings	1	Q1
Ethics and Information Technology	1	Q1
European Journal of Educational Research	1	Q1
European Journal of Marketing	1	Q1
Games for Health	1	Q2
Games for Health	1	Q1
Health and Place	1	Q1
HTS Teologiese Studies / Theological Studies	1	Q1
Human Resource Management Review	1	Q1
Industrial Marketing Management	1	Q1
Informatics	1	Q2
Information and Management	1	Q1
Information and Software Technology	1	Q2
International Journal of Advertising	1	Q1
International Journal of Design	1	Q2
International Journal of Educational Technology in Higher Education	1	Q2
International Journal of Engineering Pedagogy	1	Q1
International Journal of Human Computer Studies	6	Q1
International Journal of Management Education	2	Q2
Journal of Adolescent Research	1	Q1
Journal of Advertising	1	Q1
Journal of Business and Industrial Marketing	1	Q1
Journal of Business Ethics	2	Q1
Journal of Business Research	4	Q1
Journal of Consumer Behaviour	1	Q2
Journal of Educational Computing Research	1	Q1
Journal of Engineering Science and Technology	1	Q2
Journal of Enterprise Information Management	1	Q1
Journal of Interactive Marketing	2	Q1
Journal of Management Inquiry	2	Q1
Journal of Marketing Communication	1	Q1
Journal of Medical Internet Research	1	Q1
Journal of Pediatric Surgery	1	Q1
Journal of Product and Brand Management	1	Q1
Journal of Universal Computer Science	1	Q2
Journal of Retailing and Consumer Services	1	Q1
Journal of Theoretical and Applied Electronic Commerce Research	1	Q2
Journal of Universal Computer Science	1	Q2
Multimedia Tools and Applications	1	Q2
Nurse Education Today	1	Q1
Online Information Review	1	Q1
Personal and Ubiquitous Computing	1	Q1
Requirements Engineering	1	Q2
Research in Learning Technology	1	Q2
Seizure	1	Q1
Simulation and Gaming	2	Q2
Sustainability (Switzerland)	2	Q2
Technological Forecasting and Social Change	1	Q1
Thinking Skills and Creativity	1	Q2
Urban Planning	1	Q2

4.3. Resultados da Fase 2 – análise no Leximancer

No último passo do protocolo de investigação, foram extraídos os abstracts dos 86 artigos identificados na fase anterior, e inseridos no Leximancer utilizando as seguintes definições:

- Língua – Inglês;
- Fusão dos termos "education" + "educational";
- Fusão dos termos "game" + "games" + "gamification";
- Exclusão dos termos "article" + "analysis" + "approach".

Esta configuração manual foi feita no sentido de obter os resultados mais relevantes, evitando redundâncias; os termos excluídos são termos que tendem a surgir com frequência no *abstract* de um artigo, uma vez que se descreve o que será abordado no mesmo.

O Leximancer apresenta uma perspetiva global dos temas subjacentes aos dados analisados, os quais neste caso se trata dos abstracts dos artigos que constituem a amostra final do passo anterior. Assim, o primeiro mapa de conceitos obtido, presente na Figura 15, demonstra a existência de cinco temas principais presentes na amostra de textos. A vermelho surge o tema mais relevante, "gamification", com 301 instâncias; de seguida, temos o tema "learning" com 149 instâncias, seguido pelo tema "behavior", com 73 instâncias e o tema "performance" com 48; por fim, surge a verde o tema com menor impacto dos quatro identificados, "brand", com 43 instâncias.

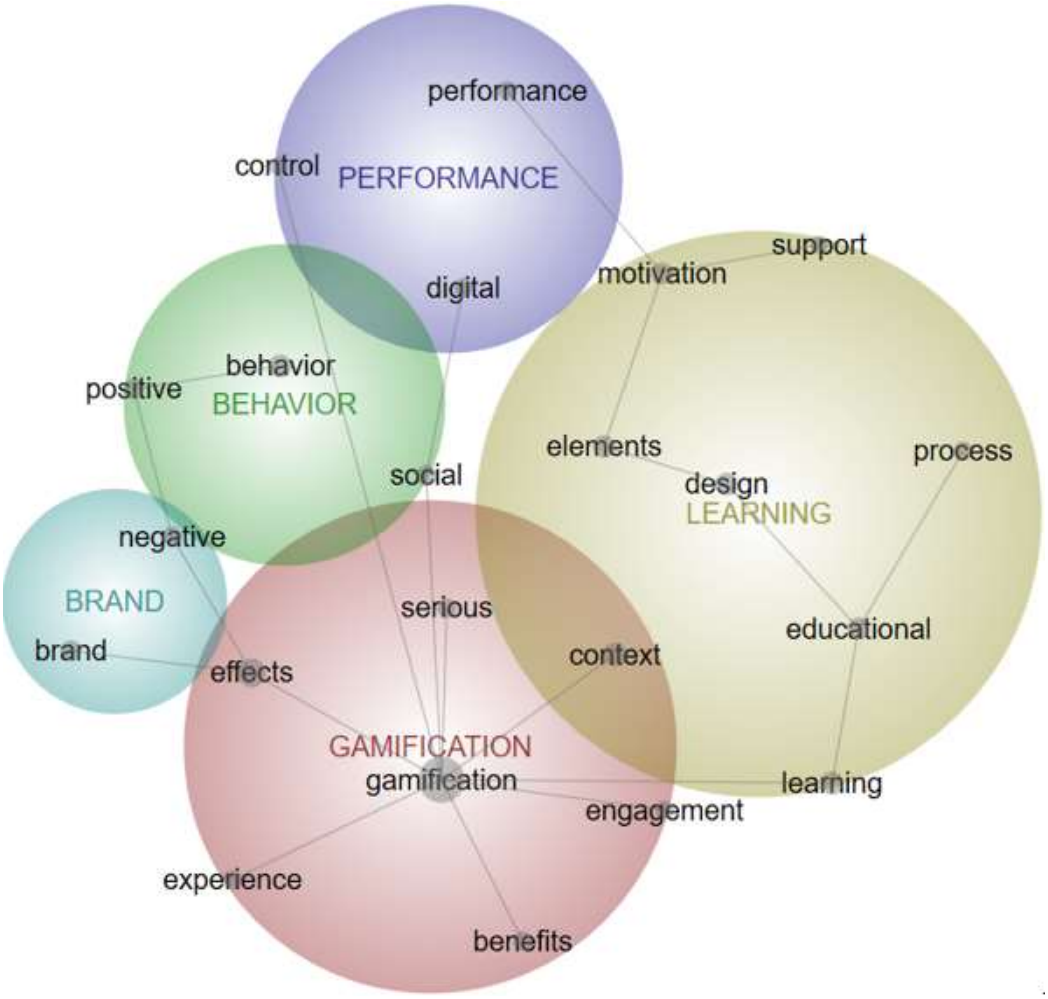

Figura 15- Primeiro mapa de conceitos obtido com recurso ao Leximancer

Dentro destes quatro temas, o Leximancer identificou 22 conceitos: *gamification, effects, learning, context, behaviour, design, educational, motivation, elements, social, brand, performance, positive, negative, serious, benefits, process, digital, support, experience, engagement, digital* e *control.*

Destes conceitos, aqueles com maior relevância (> 10%) detetados pela ferramenta nos artigos selecionados, e que não coincidem com o tema de maior intensidade (gamificação, com 100% de relevância) são: *effects, learning, contexto, behavior, design, educational, motivation, elements* e *social*.

Tabela 4 – Conceitos e respetiva relevância

Conceito	Relevância
Gamification	100%
Effects	30%
Learning	17%
Context	14%
Behavior	13%
Design	13%
Educational	12%
Motivation	12%
Elements	11%
Social	10%
Brand	9%
Performance	8%
Positive	7%
Negative	6%
Serious	6%
Benefits	6%
Process	6%
Digital	6%
Support	6%
Experience	5%
Engagement	5%
Control	4%

Colocando em evidência o conceito "*negative"*, obtemos um mapa de conceitos que mostra quais os conceitos que se relacionam mais intimamente com este, conforme explicitado nas Figuras 16 e 17.

Além de procurar e apresentar os principais conceitos contidos nos dados, o Leximancer identifica e representa também, graficamente, as relações que existem entre os conceitos. As linhas retas que unem o conceito central, "negative", na representação de conceitos em rede, representam uma associação entre ambos. Análogamente ao que sucede no mapa de conceitos, aqueles que tenham uma presença mais significativa são representados por um círculo cinzento de maior tamanho. A relação entre conceitos é também demonstrada pela probabilidade de se apresentarem juntos no texto, denominada "likelihood".

Os resultados obtidos mostram que os conceitos que se relacionam mais intimamente com o conceito "*negative"*, ou seja, que têm uma percentagem de probabilidade de aparecer associados a este maior ou igual a 10% são: *positive, experience, effects, engagement, behavior, brand* e *control.*

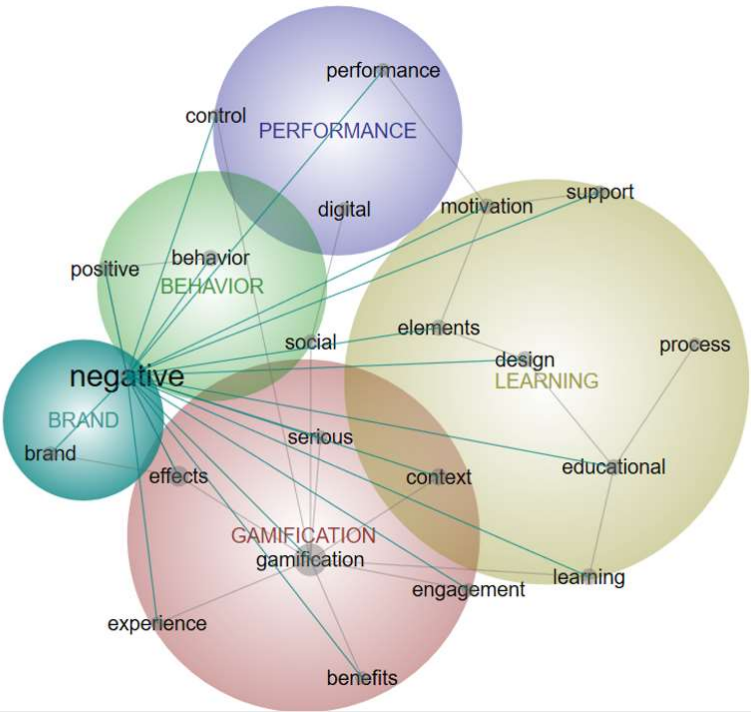

Figura 16 – Mapa de conceitos relacionados com "negative" no contexto de gamificação.

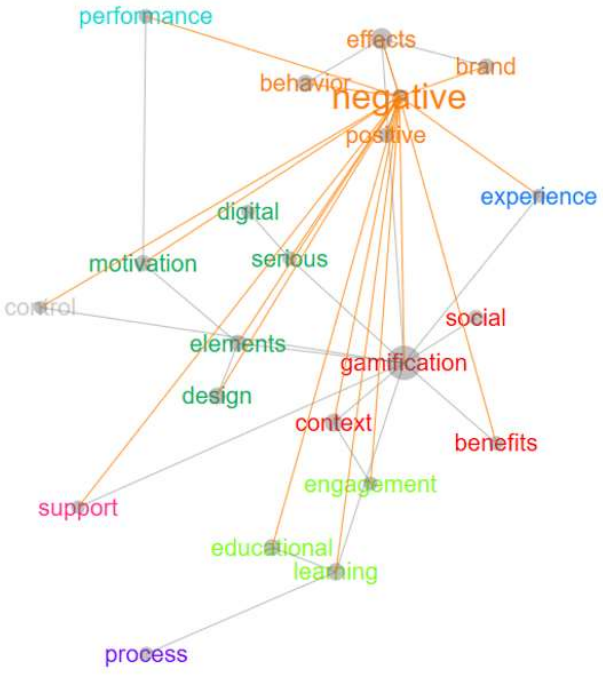

Figura 177 – Rede de conceitos relacionados com "negative" no contexto de gamificação.

Do mapa de conceitos que evidencia as relações entre estes, pondo no centro o conceito "*negative*", assim como da rede de conceitos análoga, evidenciamos as seguintes características:

- O conceito "negative" está mais próximo dos conceitos "brand", "effects", "behavior" e "positive";
- Existe uma associação direta entre o conceito "negative" e a maior parte dos conceitos detetados; as exceções são "process", "digital", "social" e "serious";
- O conceito "gamification" é o conceito mais forte que se relaciona com "negative";
- O conceito "negative" está associado a "control" dentro do tema "performance";
- Dentro do tema "learning", o conceito "negative" está associado com igual intensidade a "motivation", "support", "elements", "design", "context" e "learning";
- No âmbito do tema mais relevante, "gamification", o conceito "negative" associa-se com maior intensidade a "effects" e seguidamente a "experience", "benefits" e "engagement";
- A relação entre os conceitos "negative" e "context" ocorre na interseção entre os temas "gamification" e "learning";
- Os conceitos "negative" e "positive" associam-se dentro do tema "behavior";
- O conceito "negative" relaciona-se mais intensamente com o conceito central de cada tema;
- O tema "gamification" é o mais proeminente na análise;
- Excetuando gamification, o conceito com maior relevância, e effects, os restantes conceitos detetados pelo Leximancer possuem alguma homogeneidade em termos de relevância, uma vez que são representados graficamente com a mesma intensidade.

4.4.Discussão dos resultados

Neste trabalho de investigação, procurámos compilar a investigação existente acerca do lado negativo e das limitações da gamificação, pretendendo compreender quais os conceitos que estão relacionados com estes.

Na primeira fase procedeu-se a uma primeira revisão da literatura acerca de efeitos negativos da tecnologia, para confirmar a pertinência de estudar os efeitos negativos da gamificação. Considerando a gamificação análoga da tecnologia, procurou-se identificar, nos últimos quinze anos, interesse por parte da academia nesta temática.

Os resultados desta fase de investigação demonstraram que existem, de facto, artigos publicados em revistas de topo – Q1 e Q2 - nos quais a comunidade científica refere ou aprofunda questões relacionadas com potenciais efeitos negativos da tecnologia. Ao cobrir várias áreas científicas, cumprimos a premissa para a investigação em Sistemas de Informação, que sendo em si multidisciplinar, necessita de se aprofundar numa perspetiva transversal (Webster J. & Watson, 2002).

Ao longo do período estudado, notou-se uma tendência de maior ritmo de publicações por ano contemplando esta temática, que culminou numa maior concentração de artigos em 2018 e 2019, sugerindo uma tendência de agravamento desta preocupação.

A queda no número de artigos publicados em 2020 poderá parecer apontar para uma quebra no interesse na temática. Porém, esta diminuição abrupta pode ser justificada pelo facto de os dados para o estudo terem sido recolhidos em janeiro de 2020. Embora preliminares, argumentamos que os dados de 2020 são relevantes pelo seu caráter mais recente, apontando no sentido de uma manutenção do interesse na temática.

Deste modo, os resultados obtidos na Fase 1 sustentam a pertinência de estudar, também, o lado negativo da gamificação.

Na Fase 2, começámos por executar uma revisão sistemática da literatura acerca do lado negativo e limitações da gamificação. Para tal, compilámos uma amostra de textos referindo ou aprofundado o lado negativo da gamificação, utilizando a metodologia qualitativa de revisão sistemática da literatura.

Foram recolhidos mais de oitenta artigos, publicados em revistas científicas de quartil Q1 ou Q2, que corresponderam ao conjunto de palavras-chave definidas para capturar artigos relacionados ou sobre o lado negativo da gamificação. Também aqui, garantimos

a robustez da amostra obtida ao garantir o pressuposto da multidisciplinaridade da investigação em Sistemas de Informação de Webster e Watson (2002) e ao criar regras claras de inclusão dos artigos ao delimitar o período temporal de publicação, a língua em que foram publicados e o tipo de texto científico (Budgen, et al, 2006).

Também neste conjunto de artigos, o número de artigos por ano foi aumentando ao longo do período estudado. Porém, é de notar que, embora tenha sido utilizado o mesmo período de recolha definido para a Fase 1 (2005 a 2020), aqui apenas se detetaram artigos relevantes, de acordo com os critérios usados, a partir de 2013. Este dado sugere que a preocupação com o lado negativo da gamificação é mais recente do que a preocupação com o lado negativo da tecnologia.

Nota-se ainda que, entre o ano de 2016 e 2020, o número de artigos relevantes aumentou para os critérios de pesquisa aumentou significativamente, corroborando um maior interesse pela investigação que contempla perspetivas negativas acerca da gamificação.

A queda abrupta no número de artigos detetados em 2020 que satisfazem o conjunto de critérios usados na pesquisa pode, uma vez mais, ser justificada pela data de recolha dos mesmos corresponder ao primeiro trimestre de 2020. Caso pretendessemos extrapolar o número de artigos relevantes para a totalidade do ano de 2020, considerando um número de publicações por trimestre constante, esperar-se-ia obter, no mínimo, cerca de três dezenas de artigos. Ainda assim, o número de artigos compilados com data de publicação de 2020 sugere uma manutenção do interesse da academia pelo tema.

Dos artigos compilados nesta fase, é ainda interessante apontar que uma percentagem significativa de artigos – 22% - foi publicada em revistas científicas da àrea de Sistemas de Informação, num total de dezanove artigos.

Em suma, de acordo com os resultados obtidos no primeiro passo da Fase 2, pode dizer-se que existe, a partir de 2013, uma crescente ocupação da academia com estudos acerca do lado negativo da gamificação, com maior incidência na área de Sistemas da Informação.

Sublinha-se que o número de artigos que abordam um possível lado negativo da gamificação foi maior, para o mesmo período de quinze anos, do que o número de artigos recolhidos acerca do lado negativo da tecnologia. Se considerarmos as definições instrumentalistas de gamificação (Hamari & Koivisto,2015; Kasurinen & Knutas, 2018),

a gamificação é usada para promover comportamentos ao interferir com a motivação do indivíduo, ao criar objetivos e metas pelas quais este irá esforçar-se. Assim, este resultado pode ser explicado pelo crescente interesse da academia nas condicionantes da motivação do indivídio, nomeadamente com o surgimento da teoria da auto-determinação em 2008 (Deci & Ryan, 2008) e nos fatores que predispõem o indivíduo para para ter um determinado comportamento (Alsaweier, 2018), assim como as implicações éticas (Bogost, 2013; Cassone, 2016; Hyrynsalmi, et al, 2017).

No segundo passo da Fase 2 passámos à introdução dos abstracts dos oitenta e seis items da amostra recolhida anteriormente no Leximancer. Esta técnica permitiu-nos descobrir os temas e conceitos subjacentes aos dados estudados (Anagnostopoulos & Bason, 2015; Penela & Serrasqueiro, 2019; Rodrigues et al., 2019).

Nos resultados obtidos observamos que o tema mais relevante ao longo do conjunto de dados é a gamificação, o que era esperado face às palavras-chave utilizadas na pesquisa de literatura, uma vez que todas continham o vocábulo gamification.

No que diz respeito aos temas subjacentes, o Leximancer aponta para que, além de gamificação, aprendizagem, desempenho, comportamento e marca sejam os temas mais abordados neste conjunto de artigos. De facto, alguns dos mais relevantes contributos teóricos provêm de autores que se debruçaram sobre a gamificação como ferramenta inovadora de ensino e aprendizagem (Alsawaier, 2018; Kam & Umar, 2018; R.N. Landers, 2014; Majuri, Koivisto, & Hamari, 2018).

Dentro do âmbito do tema mais relevante, gamification, o conceito negative está mais proximamente ligado a effects, sugerindo um preocupação com os efeitos negativos e limitações da gamificação e corroborando, assim, os resultados obtidos no primeiro passo da Fase 2. Os resultados apontam para uma maior tendência de investigação no âmbito da eficácia da gamificação, ou seja, da avaliação dos efeitos desta. Mas, mais importantemente, a emergência desta conexão entre gamificação, negativo e efeitos, sugere que o verdadeiro lado negativo da gamificação esteja ligado à sua ineficácia, ou seja, de casos nos quais esta falhe no objetivo de induzir comportamentos (Kappen & Nacke, 2013), mais do que a potenciais efeitos nefastos. Se considerarmos que a gamificação se trata da utilização de elementos de jogo em contextos de não jogo, com o intuito de motivar ações e promover comportamentos nos indivíduos, a ausência destes efeitos desejados torna a gamificação inútil.

Ainda dentro do tema gamificação, chamamos a atenção para a descoberta das associações de negative com context, engagement, benefits e experience.

Consideramos as relações entre estes conceitos particularmente interessantes no âmbito da procura do lado negativo da gamificação. Duma perspetiva instrumentalista, estando este lado negativo ligado à sua aplicação ineficaz, ou seja, sem atingir o objetivo de indução ou influência de comportamentos no indivíduo (Kappen & Nacke, 2013; Kasurinen & Knutas, 2018), então podemos tirar as seguintes ilações:

1. O insucesso da gamificação deve-se a uma falha na experiência do indivíduo na situação gamificada, ou a uma má experiência. Isto é corroborado pela camada mais externa do caleidoscópio de Kappen & Nacke (2013) que representa a diversão percecionada pelo utilizador, e pela terceira camada que corresponde à experiência de jogo. Sendo estas camadas essenciais a garantir um eficaz uso da gamificação, então uma má experiência dará lugar a uma gamificação ineficaz, ou seja, não serão retirados benefícios.
2. A eficácia da gamificação está diretamente ligada com a obtenção de benefícios, o que significa que, do lado negativo da gamificação, esteja a não obtenção dos mesmos. Assim, existindo um ponto no qual não são retirados benefícios do uso da gamificação, existem limites àquilo que é proveitoso gamificar (Hamari, Koivisto, & Sarsa, 2014; Hyrynsalmi, Smed, & Kimppa, 2017; Robson et al., 2016). Este limite estabelece-se no ponto a partir do qual recurso a elementos de jogo é feito de forma irrefletida (Landers, 2019; Deterding, 2015), não trazendo consigo mais do que uma tentativa de adição de estímulos de motivação extrínseca.
3. A gamificação não eficaz está também relacionada com a motivação do indivíduo e com a sua experiência de jogo (Kappen & Nacke, 2013), ou seja, com o o modo como indivíduo interage com a situação gamificada – o que corresponde ao engagement. Do lado da motivação intrínseca, o entrosamento está particularmente ligado aos mediadores competência e afinidade, ou seja, com as interações que o indivíduo tem com os outros e com o jogo que lhe permitem sentir-se valorizado e realizado (Kam & Umar, 2018). Já do lado da motivação extrínseca, os elementos de jogo que são escolhidos para a situação gamificada são cruciais para a imersão do indivíduo e para gerar persistência (R.N. Landers, Bauer, & Callan, 2017). O lado negativo da gamificação, aqui, surgirá no caso de

uma escolha inadequada de elementos de jogo, que falhem em envolver o indivíduo na situação gamificada (Toda, Valle & Isotani, 2018).

4. Finalmente, os resultados mostram que o contexto é determinante para a eficácia ou ineficácia da aplicação de gamificação. O lado negativo da gamificação surgirá quando a sua aplicação for desadequada ao contexto, resultando numa perda parcial ou total de eficácia. A emergência do conceito "contexto" vem, assim, explicar situações em que foi aplicada gamificação a um grupo de indivíduos não se observando diferenças entre os seus resultados e os de um grupo de controlo, com o qual partilhava o mesmo contexto (Auvinen et al., 2015). A importância do contexto na aplicação bem sucedida de gamificação, ou seja, na gamificação eficaz, poderá também explicar, em parte, resultados mistos obtidos em vários estudos (Koivisto & Hamari, 2019), o que também é expresso pela ligação entre os conceitos negative e positive.

Capítulo 5 – Conclusões e recomendações

5.1. Principais conclusões

Com o desenvolvimento do trabalho de investigação que apresentámos nos capítulos anteriores, pretendemos expandir a compreensão acerca dos efeitos negativos e limitações da gamificação. Este objetivo primordial da investigação propôs contribuir para o preenchimento da falta de estudos secundários que ofereçam uma perspetiva acerca do lado negativo da gamificação.

Com a primeira fase do trabalho desenvolvido, acreditamos ter confirmado a pertinência de estudar o lado negativo e as limitações da gamificação, ao considerá-la análoga à tecnologia. Através da compilação de um número considerável de textos científicos de topo, provenientes de várias áreas diferentes, pudemos detetar a existência de preocupação da academia acerca de potenciais efeitos negativos da tecnologia.

Assim, e tomando como base a visão instrumentalista da gamificação que a classifica como uma tecnologia (Hamari e Koivisto, 2015), é plausível a existência de preocupação acerca de potenciais efeitos negativos e limitações da gamificação. Existindo essa preocupação, consideramos que é relevante o desenvolvimento de investigação do tema de gamificação numa perspetiva negativa e, portanto, o estudo do lado negativo da gamificação.

Esta conclusão é ainda reforçada pela deteção de um crescente interesse da comunidade científica pelos temas negativos da gamificação a partir de 2013, conforme comprovam os resultados obtidos pela segunda fase da investigação. Mais ainda, sabemos agora que o interesse pela temática tem vindo a intensificar-se ao longo da última década, e temos ainda bases para supor que este interesse seja mantido durante os próximos tempos.

Na terceira fase desta investigação, estreitámos o foco sobre o lado negativo da gamificação e obtivemos um conjunto de conceitos que lhe estão associados. Através da combinação de métodos qualitativos (RSL) e de uma ferramenta de análise quantitativa (o Leximancer), pudemos detetar que os conceitos que mais estreitamente se conectam com o lado negativo da gamificação são comportamento, desempenho, aprendizagem.

Vimos, nesta fase, que a o lado negativo da gamificação é, na realidade, a sua aplicação ineficaz, que não produz os efeitos desejados e que falha, portanto, na obtenção de

benefícios. Pudémos, ainda, notar que a experiência do indivíduo e o seu entrosamento com a situação gamificada são determinantes para a eficácia da gamificação.

A mais importante conclusão que retiramos, porém, é a importância do contexto para a ineficácia do uso de gamificação, nomeadamente em cenário de aprendizagem. Uma desadequada avaliação do contexto no qual se pretende atuar poderá levar à aplicação insensata de elementos de gamificação, ou ao recurso àqueles que não são os mais adequados. Neste caso, estaremos na presença da gamificação retórica (Landers, 2019; Deterding, 2015), aplicada irrefletidamente, em oposição à gamificação legítima que tem em conta os indivíduos envolvidos no processo, as suas características e necessidades psicológicas mas também o contexto em que se inserem.

5.2. Contributo teórico

O nosso objetivo com o desenvolvimento deste trabalho de investigação prende-se com a necessidade de agregação de conhecimento num sentido mais lato.

Em adição aos já existentes estudos empíricos abordando a aplicação de princípios de gamificação a situações reais e a avaliação dos resultados destas práticas no contexto respetivo, cremos que importa ter uma perspetiva transversal sobre o tema, que tenha em conta as suas potenciais falhas.

Como estudo secundário que abrange o tema do lado negativo da gamificação através de numerosas àreas de investigação, consideramos que este trabalho colmata uma lacuna existente sobre o tema. Outros estudos transversais com a mesma tónica seriam, porém, benéficos, para preencher esta lacuna.

Acreditamos, ainda, que um estudo secundário sólido proporciona uma boa base para outros estudos futuros mais específicos. Neste caso, o nosso trabalho pode ser um ponto de partida para estudos que aprofundem cada um dos conceitos descobertos e as suas implicações numa determinada área de aplicação da gamificação.

O nosso estudo contribui assim para o conhecimento acerca da gamificação na sua perspetiva transversal, mostrando o lado negativo da gamificação e algumas das condicionantes que o proporcionam. Uma melhor compreensão de potenciais falhas não previstas, argumentamos, permite a sua consideração cuidadosa antes de recorrer à gamificação. No limite, o conhecimento de dos efeitos adversos torna mais simples evitá-los, dentro duma lógica de “mal conhecido”, e tê-los em conta em estudos futuros.

5.3. Limitações do estudo

Neste estudo, partimos do objetivo de ajudar a preencher a lacuna existente na literatura de estudos secundários que oferecessem uma perspetiva transversal acerca do lado negativo da gamificação, utilizando para isso a revisão sistemática de literatura publicada nos últimos quinze anos.

Na segunda fase do estudo, foi possível encontrar mais de oitenta artigos que cumprissem as palavras-chave determinadas, fossem em língua inglesa e publicados em revistas científicas de *ranking* Q1 ou Q2; estas delimitações foram decididas com vista ao reforço da qualidade dos dados recolhidos. Porém, é possível que a inclusão de artigos de revistas científicas Q3 e Q4 tivesse trazido à luz novos temas e conceitos do lado negativo da gamificação, ou até reforçado temas e conceitos que, estando já presentes no conjunto de resultados, tenham menos representação. Da mesma forma, a inclusão de *papers* de conferência poderia ter trazido maior riqueza de informação, ao considerar aqueles que não chegam a transformar-se em artigos; em oposição correríamos o risco de obter uma intensidade falsa de certos temas e/ou conceitos por causa dos *papers* que dão origem a artigos de revista científica.

A revisão sistemática da literatura tem ainda a particularidade de fazer uso do conhecimento e decisão do investigador, por exemplo, ao fazer a revisão dos textos encontrados e na tomada de decisão acerca da sua inclusão no estudo. Embora este trabalho tenha sido feito de forma iterativa e com recurso a inter validação, a subjetividade é uma condição necessariamente subjacente ao julgamento humano. Desta forma, não podemos garantir que outro conjunto de investigadores chegasse exatamente ao mesmo conjunto de resultados, embora provavelmente chegasse a um conjunto muito semelhante de conceitos (Wohlin & Prikladniki, 2013).

5.4. Propostas de investigação futura

No seguimento do nosso estudo, surgem no horizonte algumas possibilidades para futuros trabalhos de investigação.

Em primeiro lugar, propomos a realização de um estudo similar, mas realizado dentro de um âmbito mais restrito; por exemplo, seria interessante agregar as perspetivas acerca do lado negativo da gamificação dentro da área do ensino e da aprendizagem e obter os conceitos e temas mais relevantes.

Consideramos ainda ser pertinente sugerir a investigação dos efeitos negativos e limitações da gamificação como dependência do contexto da sua aplicação. Além da possibilidade de aumentar o número de estudos empíricos neste sentido, em diferentes áreas de aplicação da gamificação, seria crucial reforçar o enquadramento teórico da importância do contexto na sua eficácia. Neste sentido, e uma vez que contexto é, mesmo assim, um conceito bastante vasto, propomos o mapeamento dos fatores inerentes ao contexto que sejam determinantes à eficácia da gamificação.

Os resultados do nosso estudo poderão servir como um ponto de partida, por exemplo, para a investigação sobre os fatores contextuais que limitam a eficácia da aplicação gamificação em situação de aprendizagem.

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Anexos e Apêndices

Anexo A

Tabela 1. Artigos com menção a efeitos negativos da tecnologia

Year	Authors	Title	Publication	*Ranking* 2018	SJR index
2007	Charlton, J. P. and Danforth, I. D. W.	Distinguishing addiction and high engagement in the context of online game playing	Computers in Human Behavior	Q1	137
2009	Burke, M. S.	The incidence of technological stress among baccalaureate nurse educators using technology during course preparation and delivery	Nurse Education Today	Q1	65
2010	Tarafdar, M., Tu, Q. and Ragu-Nathan, T.	Impact of technostress on end-user satisfaction and performance	Journal of Management Information Systems	Q1	128
2011	Grover, V. and Purvis, R.	Research Article Technostress: Technological Antecedents and Implications	MIS Quarterly	Q1	195
2012	Boyd, D. and Crawford, K.	Critical questions for big data: Provocations for a cultural, technological, and scholarly phenomenon	Information Communication and Society	Q1	59
2012	Carpenter, C. J.	Narcissism on Facebook: Self-promotional and anti-social behavior	Personality and Individual Differences	Q1	141
2012	Bucher, T.	Want to be on the top? Algorithmic power and the threat of invisibility on Facebook	New Media and Society	Q1	87
2012	Turel, O. and Serenko, A.	The benefits and dangers of enjoyment with social networking websites	European Journal of Information Systems	Q1	96
2013	Bucher, E., Fieseler, C. and Suphan, A.	The stress potential of social media in the workplace	Information Communication and Society	Q1	59
2014	Beam, M. A.	Automating the News: How Personalized News Recommender System Design Choices Impact News Reception	Communication Research	Q1	89
2014	Christy, K. R. and Fox, J	Leaderboards in a virtual classroom: A test of stereotype threat and social comparison explanations for women's math performance	Computers and Education	Q1	149

2014	Dredge, R., Gleeson, J. and De La Piedad Garcia, X.	Presentation on Facebook and risk of cyberbullying victimisation	Computers in Human Behavior	Q1	137
2014	Lee, Y. K. et al.	The dark side of smartphone usage: Psychological traits, compulsive behavior and technostress	Computers in Human Behavior	Q1	137
2014	Fuglseth, A. M. and Sørebø, Ø.	The effects of technostress within the context of employee use of ICT	Computers in Human Behavior	Q1	137
2015	Fox, J. and Moreland, J. J.	The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances	Computers in Human Behavior	Q1	137
2015	Maier, C. et al.	The effects of technostress and switching stress on discontinued use of social networking services: A study of Facebook use	Information Systems Journal	Q1	79
2015	Satici, S. A. and Uysal, R	Well-being and problematic Facebook use	Computers in Human Behavior	Q1	137
2015	Brooks, S.	Does personal social media usage affect efficiency and well-being?	Computers in Human Behavior	Q1	137
2016	Kim, T. W. and Werbach, K.	More than just a game: ethical issues in gamification	Ethics and Information Technology	Q1	41
2016	Feri, F., Giannetti, C. and Jentzsch, N.	Disclosure of personal information under risk of privacy shocks	Journal of Economic Behavior and Organization	Q1	101
2017	Baruh, L. and Popescu, M	Big data analytics and the limits of privacy self-management	New Media and Society	Q1	87
2017	Patterson, R. W. and Patterson, R. M.	Computers and productivity: Evidence from laptop use in the college classroom	Economics of Education Review	Q1	71
2017	Keusch, F. and Zhang, C.	A Review of Issues in Gamified Surveys	Social Science Computer Review	Q1	60
2017	Dylko, I. et al.	The dark side of technology: An experimental investigation of the influence of customizability technology on online political selective exposure	Computers in Human Behavior	Q1	137

2018	Park, M., Im, H. and Kim, H. Y.	"You are too friendly!" The negative effects of social media marketing on value perceptions of luxury fashion brands	Journal of Business Research	Q1	158
2018	Laconi, S. et al.	Cross-cultural study of Problematic Internet Use in nine European countries	Computers in Human Behavior	Q1	137
2018	Woodcock, J. and Johnson, M. R.	Gamification: What it is, and how to fight it	Sociological Review	Q1	73
2018	Jardine, E.	Privacy, censorship, data breaches and Internet freedom: The drivers of support and opposition to Dark Web technologies	New Media and Society	Q1	87
2018	Leclercq, T., Hammedi, W. and Poncin, I.	The Boundaries of Gamification for Engaging Customers: Effects of Losing a Contest in Online Co-creation Communities	Journal of Interactive Marketing	Q1	91
2018	Loiacono, E. and McCoy, S.	When did fun become so much work: The impact of social media invasiveness on continued social media use	Information Technology and People	Q1	54
2019	Moor, L. and Anderson, J. R.	A systematic literature review of the relationship between dark personality traits and antisocial online behaviours	Personality and Individual Differences	Q1	141
2019	Linvill, D. L.	Addressing social media dangers within and beyond the college campus	Communication Education	Q1	54
2019	Diefenbach, S. and Müssig, A.	Counterproductive effects of gamification: An analysis on the example of the gamified task manager Habitica	International Journal of Human Computer Studies	Q1	109
2019	Landers, R. N.	Gamification Misunderstood: How Badly Executed and Rhetorical Gamification Obscures Its Transformative Potential	Journal of Management Inquiry	Q1	55
2019	Perra, N. and Rocha, L. E. C	Modelling opinion dynamics in the age of algorithmic personalisation	Scientific Reports	Q1	149
2019	Sands, S. et al.	Seeing light in the dark: Investigating the dark side of social media and user response strategies	European Management Journal	Q1	89
2019	Al-Rawi, A.	The fentanyl crisis & the dark side of social media	Telematics and Informatics	Q1	48
2019	Smaldone, F., Ippolito, A. and Ruberto, M.	The shadows know me: Exploring the dark side of social media in the healthcare field	European Management Journal	Q1	89

2020	Doty, D. H. et al.	Passion as an excuse to procrastinate: A cross-cultural examination of the relationships between Obsessive Internet passion and procrastination	Computers in Human Behavior	Q1	137
2020	Wang, X., Tan, S. C. and Li, L.	Technostress in university students' technology-enhanced learning: An investigation from multidimensional person-environment misfit	Computers in Human Behavior	Q1	137
2017	Chauhan, S	A meta-analysis of the impact of technology on learning effectiveness of elementary students	Computers and Education	Q1	149
2019	Garzón, J., & Acevedo, J.	Meta-analysis of the impact of Augmented Reality on students' learning gains.	Educational Research Review	Q1	51
2018	Kates, A. W., Wu, H., & Coryn, C. L. S.	The effects of mobile phone use on academic performance: A meta-analysis.	Computers and Education	Q1	149
2018	Raguseo, E.	Big data technologies: An empirical investigation on their adoption, benefits and risks for companies	International Journal of Information Management	Q1	91
2014	Schmid, R. F., Bernard, R. M., Borokhovski, E., Tamim, R. M., Abrami, P. C., Surkes, M. A., … Woods, J	The effects of technology use in postsecondary education: A meta-analysis of classroom applications.	Computers and Education	Q1	149
2015	Sampasa-Kanyinga, H., & Lewis, R. F.	Frequent Use of Social Networking Sites is Associated with Poor Psychological Functioning among Children and Adolescents.	Cyberpsychology, Behavior, and Social Networking	Q1	119
2019	Xu, Z., Banerjee, M., Ramirez, G., Zhu, G., & Wijekumar, K. (Kay)	The effectiveness of educational technology applications on adult English language learners' writing quality: a meta-analysis.	Computer Assisted Language Learning	Q1	39

Anexo B

Tabela 2. Artigos com menção a efeitos negativos e limitações da gamificação

Ano	Autores	Título	Abstract	Publicação	Quartil
2017	Abdul Rahim, M.I. Thomas, R.H.	Gamification of Medication Adherence in Epilepsy	Adherence to medication regimens is a crucial factor in seizure-freedom and well-being for people with epilepsy. In contrast, taking medication inconsistently increases the risk of not only seizures and their adverse effects, but drug side-effects and unnecessary modifications to treatment plans. Epilepsy is prevalent across all age groups and we have been slow to utilise both the technologies and psychologies derived from computer gaming. Gaming has broken through to the mainstream and is no longer the preserve of younger males, mirroring the adoption of smart phones. 'Gamification' motivates users into engaging in an activity with a higher intensity and duration. Introducing gaming elements into a non-gaming context has the potential to transform routine tasks into more enjoyable and motivating experiences. This has been exploited by marketing executives, but also has clear uses in a healthcare setting too. We discuss how previously published frameworks could be employed to help people with epilepsy adhere to medication regimens to create a patient-focussed, modifiable and fun experience.	Seizure	Q1
2017	Albuquerque, Josmario Bittencourt, Ig I. Coelho, Jorge A.P.M. Silva, Alan P.	Does gender stereotype threat in gamified educational environments cause anxiety? An experimental study	Gamification has been used by many researchers and practitioners in online education to increase students' motivation and engagement. However, studies showed that gamification elements also caused negative effects on learning. Moreover, recent investigations reported stereotype threat by gender had impacted students performance, in particular, the use of a male-dominant leaderboard affected women math performance. In this sense, we attained to conduct a hypothetical study to investigate whether gender stereotype threat in online gamified educational scenarios influences anxiety and performance. We conducted a three-stage survey where participants were asked indirectly about their anxiety, then they were redirected to a hypothetical online gamified system to solve a logic quiz. Afterward, their anxiety was assessed one more time in order to find out how much it had changed. We found evidence indicating the male-stereotyped environment affected participants' anxiety.	Computers and Education	Q1

2019	Alexandrova, A. Rapanotti, L.	Requirements analysis gamification in legacy system replacement projects	The replacement of legacy systems in the public sector is fraught with project delays, budgetary overruns, technological and business process complexities. Moreover, the software implemented to replace legacy systems is developed or configured to largely mimic their features and functionality in order to minimize the disruption to organizational operations that accompanies the introduction of new technology. When the requirements for legacy replacement primarily replicate existing applications and processes, opportunities for business process improvement are bypassed. However, it is difficult for practitioners to transcend the business and systems models prevalent in their organizations for many years. The challenge is to support them to overcome such a difficulty, and be creative and engaged during requirements discussions. Our research aims to evaluate the utility of gamifying the requirements activities during legacy replacement projects for scoping replacement systems efforts in a way that takes advantage of opportunities for innovation while minimizing unnecessary changes to the status quo. The supplementation of the requirements process with game elements is explored in our research through the development of a requirements discussion game (RE-PROVO) and its evaluation by practitioners in two government agencies. Our findings reveal that key elements of RE-PROVO, including competition, anonymity and roleplay, encourage a more critical evaluation of business requirements in legacy replacement projects, but that the success of requirements gamification is contingent on a proper incentivization model which takes organizational culture and values into account.	Requirements Engineering	Q2

2018	Ampatzidou, C. Gugerell, K. Constantinescu, T. Devisch, O. Jauschneg, M. Berger, M.	All work and no play? Facilitating serious games and gamified applications in participatory urban planning and governance	As games and gamified applications gain prominence in the academic debate on participatory practices, it is worth examining whether the application of such tools in the daily planning practice could be beneficial. This study identifies a research–practice gap in the current state of participatory urban planning practices in three European cities. Planners and policymakers acknowledge the benefits of employing such tools to illustrate complex urban issues, evoke social learning, and make participation more accessible. However, a series of impediments relating to planners' inexperience with participatory methods, resource constraints, and sceptical adult audiences, limits the broader application of games and gamified applications within participatory urban planning practices. Games and gamified applications could become more widely employed within participatory planning processes when process facilitators become better educated and better able to judge the situations in which such tools could be implemented as part of the planning process, and if such applications are simple and useful, and if their development process is based on co-creation with the participating publics.	Urban Planning	Q2
2015	Attali, Yigal Arieli-Attali, Meirav	Gamification in assessment: Do points affect test performance?	Gamification, applying game mechanics to nongame contexts, has recently become a hot topic across a wide range of industries, and has been presented as a potential disruptive force in education. It is based on the premise that it can promote motivation and engagement and thus contribute to the learning process. However, research examining this assumption is scarce. In a set of studies we examined the effects of points, a basic element of gamification, on performance in a computerized assessment of mastery and fluency of basic mathematics concepts. The first study, with adult participants, found no effect of the point manipulation on accuracy of responses, although the speed of responses increased. In a second study, with 6-8 grade middle school participants, we found the same results for the two aspects of performance. In addition, middle school participants' reactions to the test revealed higher likeability ratings for the test under the points condition, but only in the first of the two sessions, and perceived effort during the test was higher in the points condition, but only for eighth grade students.	Computers and Education	Q1

2020	Badillo-Urquiola, Karla Chouhan, Chhaya Chancellor, Stevie De Choudhary, Munmun Wisniewski, Pamela	Beyond Parental Control: Designing Adolescent Online Safety Apps Using Value Sensitive Design	Parental control applications are designed to help parents monitor their teens and protect them from online risks. Generally, parents are considered the primary stakeholders for these apps; therefore, the apps often emphasize increased parental control through restriction and monitoring. By taking a developmental perspective and a Value Sensitive Design approach, we explore the possibility of designing more youth-centric online safety features. We asked 39 undergraduate students in the United States to create design charrettes of parental control apps that would better represent teens as stakeholders. As emerging adults, students discussed the value tensions between teens and parents and designed features to reduce and balance these tensions. While they emphasized safety, the students also designed to improve parent-teen communication, teen autonomy and privacy, and parental support. Our research contributes to the adolescent online safety literature by presenting design ideas from emerging adults that depart from the traditional paradigm of parental control. We also make a pedagogical contribution by leveraging design charrettes as a classroom tool for engaging college students in the design of youth-centered apps. We discuss why features that support parent-teen cooperation, teen privacy, and autonomy may be more developmentally appropriate for adolescents than existing parental control app designs.	Journal of Adolescent Research	Q1
2016	Baranowski, T. Blumberg, F. Buday, R. DeSmet, A. Fiellin, L.E. Green, C.S. Kato, P.M. Lu, A.S. Maloney, A.E. Mellecker, R. Thompson, D. Young, K.	Games for Health for Children - Current Status and Needed Research	Videogames for health (G4H) offer exciting, innovative, potentially highly effective methods for increasing knowledge, delivering persuasive messages, changing behaviors, and influencing health outcomes. Although early outcome results are promising, additional research is needed to determine the game design and behavior change procedures that best promote G4H effectiveness and to identify and minimize possible adverse effects. Guidelines for ideal use of different types of G4H by children and adolescents should be elucidated to enhance effectiveness and minimize adverse effects. G4H stakeholders include organizational implementers, policy makers, players and their families, researchers, designers, retailers, and publishers. All stakeholders should be involved in G4H development and have a voice in setting goals to capitalize on their insights to enhance effectiveness and use of the game. In the future, multiple targeted G4H should be available to meet a population's diverse health needs in developmentally appropriate ways. Substantial, consistent, and sophisticated research with appropriate levels of funding is needed to realize the benefits of G4H.	Games for Health Journal	Q2

2017	Barratt, Paul	Healthy competition: A qualitative study investigating persuasive technologies and the gamification of cycling	Changing socio-technical practices occurring within cycling are leading the pursuit, and its participants, to become ever more embedded into the networked digital world. GPS enabled mobile-technologies have introduced a new element of competition into recreational riding, whether on the road, competing over timed virtual segments, or online dissecting and comparing the data that has been logged and shared via dedicated ride-logging applications. In order to understand these technologies qualitative study using reflective diaries and semi-structured interviews has been conducted with experienced club cyclists who had fully experienced the effects of their arrival. These riders claim that the applications influence their route choice and motivate them to cycle more frequently, and at a greater intensity although the engagement changes over time. This paper explores how this increased motivation to exercise and compete is instigated, manifested and maintained in the everyday practices of cyclists, as well as the negative consequences of gamification.	Health and Place	Q1
2019	Bouzidi, R. De Nicola, A. Nader, F. Chalal, R.	OntoGamif: A modular ontology for integrated gamification	Gamification is known as the use of game design elements in non-game contexts. It has gained a great interest from both industrials and academics during the last years due to its role in increasing engagement of people in several sectors including business, learning, crowdsourcing and enterprise information systems. However, due to its inherent multi-disciplinarity, gamification lacks an integrated view and a holistic and consensual agreement on its foundational concepts among the stakeholders. In this context we propose OntoGamif (Ontology of Gamification), a modular ontology for the gamification domain of interest covering topics concerning, for instance, target users, organizational structures, ethical issues, and psychological factors. These are organized as seven linked modular sub-ontologies that can be used also independently to support the work of gamification designers implementing personalized gamified solutions. The process used to build OntoGamif was inspired by some of the most used ontology engineering methodologies. Moreover, we discuss the multi-perspective approach in evaluating OntoGamif including experts' validation, case study analysis, comparison to a corpus and a mapping of OntoGamif to the SUMO upper level ontology.	Applied Ontology	Q1

2019	Brom, Cyril Stárková, Tereza Bromová, Edita Děchtěrenko, Filip	Gamifying a Simulation: Do a Game Goal, Choice, Points, and Praise Enhance Learning?	Despite the increased interest in gamification approaches, there is a lack of comparative studies that shed light on the applicability of these approaches in educational contexts. In this explorative study, with an experimental design, university learners (N = 98) studied a complex process (i.e., how to brew beer) in a 2-hour-long computerized simulation. In the experimental condition, the simulation featured the following game design elements: game goals, increased freedom of choice, points, virtual currency, and praise (i.e., a gamified simulation). These elements were absent in the simulation versions used in the two control conditions. No differences in learning outcomes and intrinsic motivation variables between the gamified simulation and its nongamified versions were observed. The gamified simulation was perceived to be significantly easier than the nongamified versions ((Formula presented.) = 0.10; d = 0.74, 0.42). Of the game elements used in this study, the participants perceived most positively a clear, game-like goal. The findings are consistent with self-determination theory, cognitive-affective theory of learning from media, and cognitive load theory. The findings also support the emerging notion that caution should be applied when using gamification approaches in educational contexts.	Journal of Educational Computing Research	Q1
2019	Bruni, Luigino Pelligra, Vittorio Reggiani, Tommaso Rizzolli, Matteo	The Pied Piper: Prizes, Incentives, and Motivation Crowding-in	In mainstream business and economics, prizes such as the Presidential Medal of Freedom are understood as special types of incentives, with the peculiar features of being awarded in public, and of having largely symbolic value. Informed by both historical considerations and philosophical instances, our study defines fundamental theoretical differences between incentives and prizes. The conceptual factors highlighted by our analytical framework are then tested through a laboratory experiment. The experimental exercise aims to analyze how prizes and incentives impact actual individuals' behavior differently. Our results show that both incentives (monetary and contingent) and prizes (non-monetary and discretional rewards) boost motivation to perform if awarded publicly, but only prizes crowd in motivation promoting virtuous attitude.	Journal of Business Ethics	Q1

2019	Buijs-Spanjers, K.R. Hegge, H.H.M. Cnossen, F. Hoogendoorn, E. Jaarsma, D.A.D.C. De Rooij, S.E.	Dark Play of Serious Games: Effectiveness and Features (G4HE2018)	Objective: Choosing inappropriate or unethical actions in games is referred to as dark play. For a serious game on delirium for medical students, we aimed to investigate the potential differences between dark play and normal play on game effectiveness regarding abilities in advising care, learning motivation and engagement, and attitude toward delirious patients. Furthermore, we aimed to explore the use of different game features between the two types of play on empathy, self-efficacy, and consequences of care. Methods: We performed a two-arm randomized controlled trial including an exploratory qualitative approach with 157 medical students, who played the serious game "The Delirium Experience." Participants were randomly allocated to either the dark play or normal play group. Participants had to give three recommendations for taking care of delirious patients, and complete both the Delirium Attitude Scale, and Learning Motivation and Engagement Questionnaire to study game effectiveness. To explore game features, open questions were asked. Results: We did not find difference between the two types of play in game effectiveness. "Patient's and nurse's perspective" seem to be an important game feature for being able to empathize with a patient in both groups. To support self-efficacy, "practice how to care" and "feedback in the game" were important in both study groups. "Being able to see the importance of good interaction with the patient" was reported important for self-efficacy in the dark play group, whereas this was "seeing the consequences of care" in the normal play group. Conclusions: There seems to be no change to game effectiveness when providing players the opportunity to use dark play in a serious game. A realistic view of another person's perspective could be an important game feature to increase empathy.	Games for Health Journal	Q1

2020	Buil, I. Catalán, S. Martínez, E.	Understanding applicants' reactions to gamified recruitment	Gamification has become a trend in organisations. However, little research has empirically analysed its potential for recruitment. This study explores the antecedents and outcomes of applicants' attitudes towards a gamified recruitment tool by drawing on SDT and TAM. Data from 239 individuals who participated in a gamified recruitment process were analysed using partial least squares structural equation modelling. The results show that applicants' attitudes are associated with their perceptions of ease of use and usefulness, which are correlated with the tool's ability to satisfy their needs for competence and autonomy and to promote autonomous motivation. The findings also confirm the association between applicants' attitudes towards the gamified recruitment tool and their recommendation intention, their satisfaction with the tool and perceived organizational attractiveness. In conclusion, this study provides a theoretical foundation based on SDT and the TAM and empirical support for the use of business simulation games in gamified recruitment processes.	Journal of Business Research	Q1

2018	Calderón, A. Boubeta-Puig, J. Ruiz, M.	MEdit4CEP-Gam: A model-driven approach for user-friendly gamification design, monitoring and code generation in CEP-based systems	Gamification has been proven to increase engagement and motivation in multiple and different non-game contexts such as healthcare, education, workplace, and marketing, among others. However, many of these applications fail to achieve the desired benefits of gamification, mainly because of a poor design. Objective: This paper explores the conceptualization, implementation and monitoring phases of meaningful gamification strategies and proposes a solution for strategy experts that hides the implementation details and helps them focus only on what is crucial for the success of the strategy. The solution makes use of Model-Driven Engineering (MDE) and Complex Event Processing (CEP) technology. Method: An easy-to-use graphical editor is used to provide the high-level models that represent the design of the gamification strategy and its deployment and monitoring. These models contain the event pattern definitions to be automatically transformed into code. This code is then deployed both in a CEP engine to detect the conditions expressed in such patterns and in an enterprise service bus to execute the corresponding pattern actions. Results: The paper reports on the use of both a graphical modeling editor for gamification domain definition and a graphical modeling editor for gamification strategy design, monitoring and code generation in event-based systems. It also shows how the proposal can be used to design and automate the implementation and monitoring of a gamification strategy in an educational domain supported by a well-known Learning Management System (LMS) such as Moodle. Conclusion: It can be concluded that this unprecedented model-driven approach leveraging gamification and CEP technology provides strategy experts with the ability to graphically define gamification strategies, which can be directly transformed into code executable by event-based systems. Therefore, this is a novel solution for bringing CEP closer to any strategy expert, positively influencing the gamification strategy design, implementation and real-time monitoring processes.	Information and Software Technology	Q2

2020	Casals, M. Gangolells, M. Macarulla, M. Forcada, N. Fuertes, A. Jones, R.V.	Assessing the effectiveness of gamification in reducing domestic energy consumption: Lessons learned from the EnerGAware project	The application of gamification to encourage energy conservation behaviour in house occupants is an emerging field of research. However, empirical evidence of its effectiveness is lacking. This paper presents lessons learnt from the EU-funded EnerGAware research project, in which an innovative serious game (a game designed for purposes other than purely entertainment) was developed to promote reduced energy consumption and carbon emissions by changing social housing tenants' energy efficiency behaviour. The game was validated in a sample of European social housing using a longitudinal, two-stage experimental design, employing both pre-post and control group approaches. While some aspects of the game did not work as intended, there were nevertheless some positive impacts. The intervention increased social housing tenants' awareness and engagement in certain energy saving behaviour and provided an average electricity saving of 3.46% and an average gas saving of 7.48%. Although savings were found not to be statistically significant, an effect size was detected (0.2). Therefore, future steps should exploit all available opportunities to replicate the pilot and increase the sample size so as to gain stronger evidence of the game's impact. Preliminary results support the utility of gaming investment in the household energy efficiency field, and provide useful insights and pathways that could be incorporated into the development of future serious game interventions to foster their effectiveness.	Energy and Buildings	Q1

2019	Catalán, S. Martínez, E. Wallace, E.	Analysing mobile advergaming effectiveness: the role of flow, game repetition and brand familiarity	This paper aims to explain the effect of flow, game repetition and brand familiarity on players' brand attitude and purchase intention in the context of mobile advergaming. Design/methodology/approach: Data from 227 participants who played a mobile advergame were analysed. Structural equation modelling with partial least squares was used to test the research model. Findings: The results reveal that the independent variables (i.e. game repetition and brand familiarity) significantly influence the dependent variables explored in this study (i.e. brand attitude and purchase intentions of players). Results also show that brand familiarity influences players' flow experience, which in turn significantly affects players' purchase intentions. Research limitations/implications: The findings of this study are important for advertising practitioners and advergames' developers as understanding the determinants of mobile advergaming effectiveness is crucial for designing successful advergames that persuade players the most. Originality/value: This study contributes to the literature in two ways. First, it provides new insights into the effectiveness of mobile advergames, which is an under-researched area. Second, it offers empirical evidence of the effects of game repetition, flow and brand familiarity on mobile advergaming effectiveness.	Journal of Product and Brand Management	Q1

2019	Catalán, S. Martínez, E. Wallace, E.	The role of flow for mobile advergaming effectiveness	Purpose: Based on flow theory, the purpose of this paper is to explain why the use of mobile advergames can enhance players' brand perceptions and purchase intentions, as well as the factors that affect players' flow experience. Design/methodology/approach: Data from 212 participants who played a mobile advergame was analysed. Structural equation modelling with PLS was used to test the research model. Findings: The results reveal that challenge, interactivity, focused attention and telepresence significantly influence the flow experience while playing mobile advergames. Results also show that the greater the flow, the more positive the attitude towards the featured brand and the greater the purchase intention. Practical implications: The findings of this study are important for advertising practitioners and advergames developers as understanding the key game features that promote flow is crucial to designing engaging mobile advergames that persuade players most. Originality/value: This study contributes to the literature in two ways. First, it provides new insights into the effectiveness of mobile advergames, which is an under-researched area. Second, it offers a conceptual framework based on flow theory for understanding why the use of mobile advergames can enhance players' brand perceptions and purchase intentions.	Online Information Review	Q1
2019	Chittaro, Luca Buttussi, Fabio	Exploring the use of arcade game elements for attitude change: Two studies in the aviation safety domain	Gamification and serious games are increasingly employed for attitude change purposes. However, they frequently exploit a limited set of game elements, such as points, badges and leaderboards, and scarcely explore the use of more complex elements that make games engaging. In this paper, we focus on game elements from the arcade genre, and their use in serious games for attitude change. In particular, we propose a serious game for mobile devices that employs arcade game elements for attitude change in aviation safety, and we assess its effects with two different studies. The first study compares the immediate effects of the serious game vs. the traditional approach (safety card), showing that the game is more engaging and can improve attitudes towards aircraft emergencies in terms of users' self-efficacy and perceived vulnerability to the risk. The second study assesses the effects of the serious game when used over time (1-week) in a naturalistic setting, showing that the game can engage users and increase knowledge about correct and wrong behaviors. In both studies, engagement turned out to play a mediating role that we analyze in detail.	International Journal of Human Computer Studies	Q1

2015	Choi, Y.K. Yoon, S. Taylor, C.R.	How character presence in advergames affects brand attitude and game performance: A cross-cultural comparison	Advertising within videogames has grown in importance over the last few years. This research investigates the impact of character presence in advergames on brand attitude and game performance, and how such effects depend on national culture. A total of 130 students participated in an experiment conducted in the US and Korea. Results show that when the featured brand in an advergame was a publicly consumed product, character's presence (vs. absence) had a positive effect on attitude toward the brand and gaming performance, but when the featured brand was a privately consumed product, character's presence had a negative effect on these variables. Furthermore, the emergence of the character–product interaction effect was dependent on national culture. Theoretical and practical implications are provided.	Journal of Consumer Behaviour	Q2
2016	Courbet, D. Bernard, F. Joule, R.-V. Halimi-Falkowicz, S. Guéguenc, N.	Small clicks, great effects: The immediate and delayed influence of websites containing serious games on behavior and attitude	The number of websites containing persuasive serious games and advergames has increased over the past several years, but their immediate and delayed effects on behavior are still not well understood. The present field experiment (n D 388, varied socio-professional groups) demonstrates that interactivity linked to this type of website provokes positive effects on immediate behavior (purchases of energy-saving light bulbs, ESLBs) in a 'real setting.' It further affected the behavior (installation of ESLBs at home), the memorization of the website's arguments, gains in knowledge, attitude, and other judgments regarding ESLBs, when measured two weeks later. The digital signature of a commitment to perform an expected behavior via a web page also provokes positive behavioral effects. This can accumulate through the effects of interactivity. We close with a discussion of the possible psychological processes involved, theoretical and practical implications and limitations as well as new perspectives for advertising and advergames research.	International Journal of Advertising	Q1

2019	Daems, Kristien De Pelsmacker, Patrick Moons, Ingrid	The effect of ad integration and interactivity on young teenagers' memory, brand attitude and personal data sharing	Contemporary online advertising is characterized by the integration of advertising in other content and brand interactivity. Integrated advertising embeds a persuasive message into informative or entertaining content. Brand interactivity refers to interactions consumers have with brands in advertising messages. A two (integration vs. no integration) x two (brand interactivity vs. no brand interactivity) between subjects experiment (n = 576) examines the effect of online advertising's brand interactivity and its integration in other content on young teenagers' (11–14 years) brand memory, awareness of selling intent, critical processing, brand attitude, and their personal information sharing. Brand interactivity has a positive effect on memory, awareness of selling intent, brand attitude and personal information sharing. Integration of advertising in other content has a negative effect on memory, but has no effect on awareness of selling intent, brand attitude and personal information sharing. Surprisingly, awareness of selling intent leads to less critical processing. The main contribution of the study is that it disentangles the effects of brand interactivity and message integration in contemporary advertising formats, and suggests adaptations to well-known theories, such as the Affect Transfer Mechanism and the Persuasion Knowledge Model, in the context of young teenagers' responses to these formats.	Computers in Human Behavior	Q1
2016	De-Marcos, Luis Garcia-Lopez, Eva Garcia-Cabot, Antonio	On the effectiveness of game-like and social approaches in learning: Comparing educational gaming, gamification & social networking	Game-like approaches are becoming increasingly popular in education, with educational games and gamification drawing increasing levels of attention. While games specifically designed for educational purposes have been used for decades, gamification is particularly new and contrasting evidence was presented about its effectiveness. The potential of social networks has also been harnessed by educators and institutions either using popular social networking sites or specific educational instances. This paper studies how well-established approaches (educational game and social networking) compare with more novel ones (gamification and social gamification) in terms of learning performance in an undergraduate course. Four experimental conditions were compared in an experiment (N = 379). Results suggest that all experimental conditions significantly impact on learning performance, but social gamification returned better results in terms of immediacy and for all types of assessments.	Computers and Education	Q1

2017	Dias, J.	Teaching operations research to undergraduate management students: The role of gamification	Gamification has been successfully applied in some educational environments, however there is a lack of studies considering gamification applied to Management university courses. In this paper, the experience of applying gamification in an Operations Research/Management Science course taught to undergraduate management students will be described. The use of challenges, points, personalized feedback, badges and leaderboards was considered to implement the most important game mechanics and related dynamics. It was possible to observe an increase of students' participation in classes, an increase in the percentage of approved students and a better assessment of the course made by the students. Some recommendations on how to implement an Operations Research course for management students are also given.	International Journal of Management Education	
2017	Dichev, Christo Dicheva, Darina	Gamifying education: what is known, what is believed and what remains uncertain: a critical review	Gamification of education is a developing approach for increasing learners' motivation and engagement by incorporating game design elements in educational environments. With the growing popularity of gamification and yet mixed success of its application in educational contexts, the current review is aiming to shed a more realistic light on the research in this field by focusing on empirical evidence rather than on potentialities, beliefs or preferences. Accordingly, it critically examines the advancement in gamifying education. The discussion is structured around the used gamification mechanisms, the gamified subjects, the type of gamified learning activities, and the study goals, with an emphasis on the reliability and validity of the reported outcomes. To improve our understanding and offer a more realistic picture of the progress of gamification in education, consistent with the presented evidence, we examine both the outcomes reported in the papers and how they have been obtained. While the gamification in education is still a growing phenomenon, the review reveals that (i) insufficient evidence exists to support the long-term benefits of gamification in educational contexts; (ii) the practice of gamifying learning has outpaced researchers' understanding of its mechanisms and methods; (iii) the knowledge of how to gamify an activity in accordance with the specifics of the educational context is still limited. The review highlights the need for systematically designed studies and rigorously tested approaches confirming the educational benefits of gamification, if gamified learning is to become a recognized instructional approach.	International Journal of Educational Technology in Higher Education	Q2

2019	Diefenbach, S. Müssig, A.	Counterproductive effects of gamification: An analysis on the example of the gamified task manager Habitica	The concept of gamification has evoked increasing attention in HCI research and practice. Gamification uses game elements in serious, non-game contexts in order to motivate a particular target behavior or attitude change (e.g., sustainable behavior, physical activity, task management). While gamification has been attributed a high potential, a critical question is whether it actually induces the intended effect. The present research explores ``counterproductive effects of gamification", i.e., cases when a gamification element does not encourage the intended behavior but rather the opposite (e.g., procrastination instead of getting things done). Studying the example of the gamified task manager Habitica, our paper reports insights from two consecutive studies. Study 1, a qualitative interview study based on interpretative phenomenological analysis (IPA) with one single user revealed seven themes describing distinct counterproductive effects in Habitica, and additional seven themes related to Habitica's reward/punishment system and psychological reactions to counterproductive effects. Study 2 further explored these findings in a quantitative field study with 45 users over a two-week usage period, also studying correlations to user experience, product evaluation, motivation to play Habitica and individual belief in gamification. All participants experienced counterproductive effects to some degree, whereby some effects (e.g., being punished by Habitica in especially productive times, since one does not manage to check off tasks in time) were more prevalent than others (e.g., relabeling tasks as positive habits with no due date to prevent the risk of punishments). The prevalence of counterproductive effects was correlated to the users' perceived inappropriateness of the reward system, and a crucial predictor for motivation change over time. Relations to psychological mechanisms, general implications for gamification design and future research directions are discussed.	International Journal of Human Computer Studies	Q1

2019	Dissanayake, Indika Mehta, Nikhil Palvia, Prashant Taras, Vasyl Amoako-Gyampah, Kwasi	Competition matters! Self-efficacy, effort, and performance in crowdsourcing teams	Advances in information technologies (IT) have enabled organizations to seek solutions for their business problems from beyond their own workforce through digital crowdsourcing platforms. In the most common form of crowdsourcing, teams that offer solutions compete for rewards. Thus, a question of interest is whether competition is a key crowdsourcing characteristic that influences how teams allocate their effort and achieve desired performance. Motivated by this question, we investigate how competition moderates the relationship between self-efficacy and effort using comprehensive, time-variant data collected from crowdsourcing teams that completed a project under competitive and non-competitive conditions. Under competitive conditions, self-efficacy shows a positive effect on effort, which in turn, affects performance positively. Whereas, under noncompetitive conditions, self-efficacy has a negative effect on effort and subsequently on performance. Our results also show a recursive relationship between self-efficacy and performance, in which performance subsequently affects self-efficacy positively. Thus, inducing a sense of competition through competitive reward structures and IT-based "gaming elements" helps improve team effort and subsequent performance. We also tested for mediation of team motivation in the self-efficacy and effort relationship, and we found that motivation partially mediates the relationship. Based on our findings, implications for both theory and practice are discussed.	Information and Management	Q1

2019	Dymora, P. Niemiec, K.	Gamification as a supportive tool for school children with dyslexia	Gamification, in its nature, combines not only games but also the whole psychological environment. Thanks to this, a properly prepared implementation of gameplaying can encourage people to compete with others and achieve the set tasks and goals. A person feels fulfilled that through his actions has performed a mission or reached a new level. It stimulates them to continue their activity and self-improvement to be better and beat their records. Its advantage is also that it does not have to be limited to one technology or method-it can be realized both through a simple scenario and a corkboard with results, it can also be embedded, e.g., in a virtual or augmented reality. This article focuses on the gamification of dyslexia, a common disorder of developmental disorders among pupils. It affects about 10%-15% of school-age children. The research narrowed the field of the study to one of the aspects of developmental dyslexia-dysorthography and making spelling mistakes by people affected by this disorder. This work aims to present an original application which is using gamification as a supportive tool for the learning of school children with diagnosed dyslexia. The conducted study was based on the implementation of original algorithms and scenarios of gamification on mobile devices, especially smartphones. School children are following a gamification approach for a specified period. As a conclusion, it can be stated that the proposed framework and gamification can help in the learning of people with dyslexia.	Informatics	

2019	Featherstone, Mark Habgood, Jacob	UniCraft: Exploring the impact of asynchronous multiplayer game elements in gamification	This paper describes the development and evaluation of UniCraft: a gamified mobile app designed to increase the engagement of undergraduate students with the content and delivery of their course. Gamification projects rely on extrinsic motivators to encourage participants to engage, such as compulsory participation or real-world rewards. UniCraft incorporates an asynchronous multiplayer Battle Game that uses constructive competition to motivate students, without using motivational levers that may reduce intrinsic motivation. The novel Battle Game employed by UniCraft employs Player vs Environment (Shafer, 2012) and Player Matching (Jennings, 2014) to ensure students work together in similarly ranked small groups as a team against a shared enemy. A study was undertaken which examined students' long-term engagement with UniCraft within the context of a 12-week long undergraduate programming course. The app was initially provided with the battle feature disabled, so that the effect on motivation and engagement could be studied when it was introduced during the intervention. Detailed interaction data recorded by the app was augmented by semi-structured interviews in order to provide a richer perspective on its effect at an individual and group level. The interaction data revealed convincing evidence for the increased motivational power of the battle feature, and this was supported by the interview data. Although no direct negative effects of competition were observed, interviews revealed that cheating was prevalent and this could in turn have unintended negative side-effects on motivation. Full results are presented and case studies are described for three of the participants, giving an insight into the different styles of interaction and motivation experienced by students in this study.	International Journal of Human Computer Studies	Q1

2019	Foroughi, B. Iranmanesh, M. Hyun, S.S.	Understanding the determinants of mobile banking continuance usage intention	Purpose: The quality of people life and efficiency of banks can be improved by mobile banking (m-banking). The long-term success of m-banking depends on its constant use. The purpose of this paper is to investigate the determinants of m-banking continuance intention to use, using the technology continuance theory (TCT) by including the self-efficacy and channel preference. Design/methodology/approach: Empirical data from 369 Malaysian users who had prior experience with mobile banking were analysed, using partial least squares technique. Findings: The results confirmed that the TCT model had a high exploratory power in explaining users' perceived usefulness (PU), satisfaction, attitude and intentions to continue to use m-banking. Furthermore, self-efficacy and channel importance were important drivers of continuance intention in the context of m-banking. According to the results, perceived ease of use has no effect on PU and attitude in the post-adoption stage. Practical implications: The findings help bank managers to understand the importance of meeting customers' needs and expectations as a prerequisite in enhancing their satisfaction and favourable attitude towards m-banking and consequently their continuance intention. Originality/value: Based on the TCT model, this study contributes to the limited body of research on continuance intention to use m-banking. Furthermore, self-efficacy and channel preferences were added to the TCT model and the results confirmed the importance of enriching the TCT model to explain continuance intention to use information systems by adding contextual factors.	Journal of Enterprise Information Management	Q1

2019	Gamification in apps and technologies for improving mental health and well-being: Systematic review	Gamification in apps and technologies for improving mental health and well-being: Systematic review	Background: There is little research on the application of gamification to mental health and well-being. Furthermore, usage of gamification-related terminology is inconsistent. Current applications of gamification for health and well-being have also been critiqued for adopting a behaviorist approach that relies on positive reinforcement and extrinsic motivators. Objective: This study aimed to analyze current applications of gamification for mental health and well-being by answering 3 research questions (RQs). RQ1: which gamification elements are most commonly applied to apps and technologies for improving mental health and well-being? RQ2: which mental health and well-being domains are most commonly targeted by these gamified apps and technologies? RQ3: what reasons do researchers give for applying gamification to these apps and technologies? A systematic review of the literature was conducted to answer these questions. Methods: We searched ACM Digital Library, CINAHL, Cochrane Library, EMBASE, IEEE Explore, JMIR, MEDLINE, PsycINFO, PubMed, ScienceDirect, Scopus, and Web of Science for qualifying papers published between the years 2013 and 2018. To answer RQ1 and RQ2, papers were coded for gamification elements and mental health and well-being domains according to existing taxonomies in the game studies and medical literature. During the coding process, it was necessary to adapt our coding frame and revise these taxonomies. Thematic analysis was conducted to answer RQ3. Results: The search and screening process identified 70 qualifying papers that collectively reported on 50 apps and technologies. The most commonly observed gamification elements were levels or progress feedback, points or scoring, rewards or prizes, narrative or theme, personalization, and customization; the least commonly observed elements were artificial assistance, unlockable content, social cooperation, exploratory or open-world approach, artificial challenge, and randomness. The most commonly observed mental health and well-being domains were anxiety disorders and well-being, whereas the least commonly observed domains were conduct disorder and bipolar disorders. Researchers' justification for applying gamification to improving mental health and well-being was coded in 59% (41/70) of the papers and was broadly divided into 2 themes: (1) promoting engagement and (2) enhancing an intervention's intended effects. Conclusions: Our findings suggest that the current application of gamification to apps and technologies for improving mental health and well-being does not align with the trend of positive reinforcement critiqued in the greater health and well-being literature. We also observed overlap between the most commonly used gamification techniques and existing behavior change frameworks. Results also suggest that the application of gamification is not driven by health behavior change theory, and that many researchers may treat gamification as a black box without consideration for its underlying mechanisms. We call for the inclusion of more comprehensive and explicit descriptions of how gamification is applied and the standardization of applied games terminology within and across fields.	Journal of Medical Internet Research	Q1

2016	Ghosh, T.	Winning Versus not Losing: Exploring the Effects of In-Game Advertising Outcome on its Effectiveness	Prior literary works on product placement in games predominantly focus on a host of game and brand characteristics to eventually explore their effects on consumers' psychological responses and behavior. One primary facet of in-game advertising (IGA) that has largely been ignored is game outcome in terms of winning and losing and its effect on consumers' nature of information processing. This article explores the effect of IGA outcome and performance feedback shown to players on their motivation expressed in terms of induced regulatory focus. Further, the effects of regulatory focus are examined on players' implicit and explicit memory, game and brand attitude, and emotions. A conceptual framework highlighting afore-mentioned relationships is developed and empirically tested which reveals that IGA outcome and performance feedback in the form of game messages plays a major role in explaining players' motivation which in turn also affects their memory and attitude. Managerial implications, limitations, and scope for future research are also discussed.	Journal of Interactive Marketing	Q1
2019	Groening, Christopher Binnewies, Carmen	"Achievement unlocked!" - The impact of digital achievements as a gamification element on motivation and performance	Gamification experiences further growth in our society with broad practical implications of game design elements in applications, activities, and services. In our study, we focus on one single element in the form of digital achievements, one cornerstone of gamification, to gain unconfounded insights into the effects and working mechanisms of digital achievements. In a controlled experimental environment we investigate their impact on motivation and performance. Three research questions were investigated, first, if achievements are effective in enhancing motivation and performance, second, how achievements need to be designed to be effective, and third, if achievements' underlying working mechanisms resemble classical goal-setting. In three experiments, a total of 245 participants worked on different cognitive tasks. We experimentally manipulated several aspects of achievements, such as quantity and difficulty. We also compared achievements directly with classical goal-setting instructions. Results showed that achievements enhanced performance. Achievements also improved motivation, however only regarding persistence, not self-reported interest and enjoyment. The effectiveness of achievements was highly dependent on the design. Results suggest utilizing achievements with high difficulty and in low quantity. Results also support our assumption that achievements provide a direct goal-setting function. We conclude that achievements do benefit motivation and performance if designed properly.	Computers in Human Behavior	Q1

2016	Guegan, J. Buisine, S. Mantelet, F. Maranzana, N. Segonds, F.	Avatar-mediated creativity: When embodying inventors makes engineers more creative	An important challenge today is to support creativity while enabling geographically distant people to work together. In line with the componential theory of creativity, self-perception theory and recent research on the Proteus Effect, we investigate how avatars, which are virtual representations of the self, may be a medium for stimulating creativity. For this purpose, we conducted two studies with a population of engineering students. In the first study, 114 participants responded to online surveys in order to identify what a creative avatar may look like. This enabled us to select avatars representing inventors, which were perceived as creative by engineering students, and neutral avatars. In the second study, 54 participants brainstormed in groups of 3, in 3 different conditions: in a control face-to-face situation, in a virtual environment while embodying neutral avatars and in a virtual environment with inventor avatars. The results show that inventor avatars led to higher performance in fluency and originality of ideas. Moreover, this benefit proved to endure over time since participants allocated to inventor avatars also performed better in a subsequent face-to-face brainstorming. The prospects of using avatars for enhancing creativity-relevant processes are discussed in terms of theoretical and applicative implications.	Computers in Human Behavior	Q1
2019	Gundry, David Deterding, Sebastian	Validity Threats in Quantitative Data Collection With Games: A Narrative Survey	Background. Games are increasingly used to collect scientific data. Some suggest that game features like high cognitive load may limit the inferences we can draw from such data, yet no systematic overview exists of potential validity threats of game-based methods. Aim. We present a narrative survey of documented and potential threats to validity in using games for quantitative data collection. Method. We combined an unsystematic bottom-up literature review with a systematic top-down application of standard validity threat typologies to games to arrive at a systematisation of game-characteristic validity threats. Results. We identify three game characteristics that potentially impact validity: Games are complex systems, impeding the predictable control and isolation of treatments. They are rich in unwanted variance and diversity. And their social framing can differ from and interact with the framing of research studies or non-game situations they are supposed to represent. The diversity of gamers and their differences to general populations bring further complications. Discussion and Conclusions. The wealth of potential validity threats in game-based research is met by a dearth of systematic methodological studies, leading us to outline several future research directions.	Simulation and Gaming	Q2

2014	Hamari, Juho Koivisto, Jonna	Measuring flow in gamification: Dispositional Flow Scale-2	This paper measures flow in the context of gamification and investigates the psychometric properties of the Dispositional Flow Scale-2 (DFS-2). We employ data gathered from users of an exercise gamification service (N = 200). The results show that the original DFS-2 factorial structure does result in a similar model fit as the original work. However, we also present a factorial respecification that satisfies more recent model fit thresholds. Beyond validating the original DFS-2 instrument in the context of gamification, the psychometric analysis and the respecifications suggest that the components of flow divide into highly correlated conditions of flow (which were also found to be more salient in the context of gamification: autotelic experience, balance of skill and challenge, control, clear goals, and feedback) and into possible outcomes (merging action-awareness, concentration, loss of sense of time, and loss of self-consciousness) from achieving flow.	Computers in Human Behavior	Q1
2015	Hanus, Michael D. Fox, Jesse	Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance	Gamification, the application of game elements to non-game settings, continues to grow in popularity as a method to increase student engagement in the classroom. We tested students across two courses, measuring their motivation, social comparison, effort, satisfaction, learner empowerment, and academic performance at four points during a 16-week semester. One course received a gamified curriculum, featuring a leaderboard and badges, whereas the other course received the same curriculum without the gamified elements. Our results found that students in the gamified course showed less motivation, satisfaction, and empowerment over time than those in the non-gamified class. The effect of course type on students' final exam scores was mediated by students' levels of intrinsic motivation, with students in the gamified course showing less motivation and lower final exam scores than the non-gamified class. This suggests that some care should be taken when applying certain gamification mechanics to educational settings.	Computers and Education	Q1

2019	Hensen, B. Koren, I. Klamma, R.	Gamification support for learning in spatial computing environments	With the rise of mixed reality hardware and software, new opportunities in formal higher education arise, e.g. in anatomy, as the usage of 3D structures instead of 2D images or anatomical models supports a better understanding and enhances the learning process. But even with access to virtual 3D models, motivation is a key element for successful learning and for progressing over a longer period of time. Mixed reality spaces offer new opportunities for combining a 3D stereoscopic depth perception of anatomic models together with gamification and interactive learning. Virtual 3D models can be enhanced with additional information which can name and explain separate elements. Therefore, we developed GaMR, a gamified framework for learning in mixed reality, where 3D models can be experienced on the Microsoft HoloLens and the HTC Vive. Quiz creation is supported by placing annotations on the model. Progress is rewarded by badges. The gamification strategy guides the student and gives feedback about the learning progress. This open source gamification framework for mixed reality was evaluated with students and doctors from a medical university. It showed that it can be employed in many academic and industrial use cases.	Journal of Universal Computer Science	Q2
2019	Högberg, Johan Shams, Poja Wästlund, Erik	Gamified in-store mobile marketing: The mixed effect of gamified point-of-purchase advertising	This study investigates the effect of gamification on in-store mobile advertisement. More specifically, it investigates the effect of gamification on the inclination to act on offers gained at point of purchase. For this purpose, a field experiment was conducted at a supermarket, where real customers were recruited. Eye tracking, smartphone activity logging and choice were used to investigate the customers' behaviour. The results reveal that gamification is not always useful for increasing the tendency to act on offers. In fact, engagement in a gamified shopping task is needed; otherwise, the tendency to act on offers might even decrease when gamifying.	Journal of Retailing and Consumer Services	Q1
2016	Howard-Jones, P.A. Jay, T.	Reward, learning and games	The link between reward and learning has chiefly been studied scientifically in the context of reinforcement learning. This type of learning, which relies upon midbrain dopaminergic response, differs greatly from the learning valued by educators, which typically involves declarative memory formation. However, with recent insights regarding the modulation of hippocampal function by midbrain dopamine, scientific understanding of the midbrain response to reward may be becoming more relevant to education. Here, we consider the potential for our current understanding of reward to inform educational learning, and consider its implications for game-like interventions in the classroom.	Current Opinion in Behavioral Sciences	Q1

2018	Hsu, Chia Lin Chen, Mu Chen	How does gamification improve user experience? An empirical investigation on the antecedences and consequences of user experience and its mediating role	Given the growing commercial importance of the “user experience”, better application of gamification. Thus, this study aims at exploring the antecedents and consequences of user experience and its mediating role in an online gamification context. Specifically, this study uses structural equation modeling to test the causal relationships among perceived mobility, utilitarian and hedonic features, user experience, perceived benefits (self-benefit and social benefit), types of perceived value (information value, experiential value, social value, and transaction value), and brand equity (perceived quality, brand loyalty, brand associations, and brand trust) in an online gamification context. Results show that perceived mobility has a significant impact on utilitarian and hedonic features, while perceived mobility and utilitarian and hedonic features influence user experience, which in turn, affects perceived benefits, types of perceived value, and brand equity. Additionally, the mediating effect of user experience is also confirmed in this study. In summary, the findings of this study can help website managers improve their users' perception of benefits, value, and brand equity more effectively and act as a guide to research and development (R&D) of gamification to obtain competitive advantage in the online context.	Technological Forecasting and Social Change	Q1

2018	Kam, Adele H.T. Umar, Irfan N.	Fostering authentic learning motivations through gamification: A self-determination theory (SDT) approach	Gamification is the use of game design elements in non-game contexts. It has been enthusiastically employed in various fields such as web-based businesses, health, wellness, and has been widely researched in the field of education. While many of the pioneer studies revealed positive effects of gamification for learning, more inconclusive and even negative effects have been reported in subsequent research. It is also uncertain whether the positive outcomes are sustainable and not limited to just novelty effects. Studies in this field continue to mature and the thrust is to move beyond the preliminary and often vague question of "Does gamification work?" to more specific inquiries like "Why does gamification work?", "What is gamification's effect?" or "How to make gamification work?" In order for the knowledge gains from research studies to be synthesizable, there has been a call for gamification approaches to be based upon established psychological, behavioural or learning theories instead of ad hoc methods. This paper responds to this need by presenting a gamification framework that is based on the well-established motivational theory, the Self-Determination Theory (SDT). The SDT addresses motivation through the distinction of intrinsic and extrinsic motivation. In order to foster authentic learning motivations, gamification should be designed to affect intrinsic motivation for the learning activity itself. This paper outlines how this can be achieved by strategically employing game dynamics and components to meet the psychological needs that support intrinsic motivation.	Journal of Engineering Science and Technology	Q2

2014	Karen Jacobsen and Ivan Cardona	Guidance for Profiling Urban Displacement Situations: Challenges and Solutions	While gamification is gaining ground in business, marketing, corporate management, and wellness initiatives, its application in education is still an emerging trend. This article presents a study of the published empirical research on the application of gamification to education. The study is limited to papers that discuss explicitly the effects of using game elements in specific educational contexts. It employs a systematic mapping design. Accordingly, a categorical structure for classifying the research results is proposed based on the extracted topics discussed in the reviewed papers. The categories include gamification design principles, game mechanics, context of applying gamification (type of application, educational level, and academic subject), implementation, and evaluation. By mapping the published works to the classification criteria and analyzing them, the study highlights the directions of the currently conducted empirical research on applying gamification to education. It also indicates some major obstacles and needs, such as the need for proper technological support, for controlled studies demonstrating reliable positive or negative results of using specific game elements in particular educational contexts, etc. Although most of the reviewed papers report promising results, more substantial empirical research is needed to determine whether both extrinsic and intrinsic motivation of the learners can be influenced by gamification.	Educational Technology & Society	Q1
2018	Kim, Tae Wan	Gamification of Labor and the Charge of Exploitation	Recently, business organizations have increasingly turned to a novel form of non-monetary incentives—that is, "gamification," which refers to a motivation technique using video game elements, such as digital points, badges, and friendly competition in non-game contexts like workplaces. The introduction of gamification to the context of human resource management has immediately become embroiled in serious moral debates. Most notable is the accusation that using gamification as a motivation tool, employers exploit workers. This article offers an in-depth analysis of the moral charge of exploitation. This article maintains that there are no clear grounds for believing that gamification of labor is exploitative and that if gamification of labor involves a wrong or vice, it must be something other than exploitation.	Journal of Business Ethics	Q1

2016	Kim, Tae Wan Werbach, Kevin	More than just a game: ethical issues in gamification	Gamification is the use of elements and techniques from video game design in non-game contexts. Amid the rapid growth of this practice, normative questions have been under-explored. The primary goal of this article is to develop a normatively sophisticated and descriptively rich account for appropriately addressing major ethical considerations associated with gamification. The framework suggests that practitioners and designers should be precautious about, primarily, but not limited to, whether or not their use of gamification practices: (1) takes unfair advantage of workers (e.g., exploitation); (2) infringes any involved workers' or customers' autonomy (e.g., manipulation); (3) intentionally or unintentionally harms workers and other involved parties; or (4) has a negative effect on the moral character of involved parties.	Ethics and Information Technology	Q1
2019	Küpper, Denise Marie Klein, Kristina Völckner, Franziska	Gamifying employer branding: An integrating framework and research propositions for a new HRM approach in the digitized economy	The digital age calls for digital HRM approaches, as the "digitized" workforce confronts companies with changing requirements regarding their human resource practices. Most importantly, companies need to build strong employer brands to attract, motivate, and retain employees. One promising approach to employer branding in the digital age is to gamify companies' employer branding activities by means of serious games (i.e., digital games with an educational purpose). Both serious games and employer branding share the key characteristic of facilitating learning to create knowledge. Despite existing research on employer branding and serious games in separate streams, virtually no research addresses their relationship, albeit its strong relevance for researchers and practitioners alike. The authors discuss both domains and their relation, propose a conceptual framework building on a novel learning-based extension of the affective events theory, and derive directions for future research to advance the understanding of gamifying employer branding in the digitized economy.	Human Resource Management Review	Q1

2018	Kyewski, Elias Krämer, Nicole C.	To gamify or not to gamify? An experimental field study of the influence of badges on motivation, activity, and performance in an online learning course	Over the last few years, the implementation of game elements like badges in non-game environments has become increasingly popular (Butler, 2014). In this study, we tested whether badges, which could be received for successful task performance and specific activities within an e-learning course in a higher education setting, had an impact on students' motivation and performance. In a between-subjects experimental field study, students were randomly assigned to three different conditions (no badges, badges visible to peers, badges only visible to students themselves). The results show that badges have less impact on motivation and performance than is commonly assumed. Independent of condition, students' intrinsic motivation decreased over time. Contrary to expectation, the badges that could only be viewed by the students themselves were evaluated more positively than those that could also be viewed by others.	Computers and Education	Q1
2019	Landers, R.N.	Gamification Misunderstood : How Badly Executed and Rhetorical Gamification Obscures Its Transformativ e Potential	Although management gamification has immense potential to broadly benefit both management and employees, its impact to date has been lackluster and its value unclear. I credit this to a market proliferation of rhetorical or "fake" gamification, a process which involves the decoration of existing organizational processes with game elements but with little or no attention paid to the psychological processes by which those elements influence human behavior. For gamification to be successful, specific psychological characteristics of employees or customers must be targeted, and game elements must be chosen to influence those characteristics. In theoretical terms, legitimate gamification in management can be defined as a family of work and product design techniques inspired by game design, whereas rhetorical gamification is at best novice gameful design and at worst a swindle, an attempt to make something appear "game-like" purely to sell more gamification. Only by carefully distinguishing legitimate and rhetorical gamification can legitimate gamification's potential be fully realized.	Journal of Management Inquiry	Q1

2014	Landers, R.N.	Developing a Theory of Gamified Learning: Linking Serious Games and Gamification of Learning	Gamification has been defined as the use of characteristics commonly associated with video games in non-game contexts. In this article, I reframe this definition in terms of the game attribute taxonomy presented by Bedwell and colleagues. This linking is done with the goal of aligning the research literatures of serious games and gamification. A psychological theory of gamified learning is developed and explored. Conclusion. In the theory of gamified learning, gamification is defined as the use of game attributes, as defined by the Bedwell taxonomy, outside the context of a game with the purpose of affecting learning-related behaviors or attitudes. These behaviors/attitudes, in turn, influence learning by one or two processes: by strengthening the relationship between instructional design quality and outcomes (a moderating process) and/or by influencing learning directly (a mediating process). This is contrasted with a serious games approach in which manipulation of game attributes is typically intended to affect learning without this type of behavioral mediator/moderator. Examples of each game attribute category as it might be applied in gamification are provided, along with specific recommendations for the rigorous, scientific study of gamification.	Simulation and Gaming	

2017	Landers, R.N. Bauer, K.N. Callan, R.C.	Gamification of task performance with leaderboards: A goal setting experiment	The use of leaderboards is a common approach to the gamification of employee performance, but little is known about the specific mechanisms and mediating processes by which leaderboards actually affect employee behavior. Given the lack of research in this domain, this study proposes goal-setting theory, one of the most well-established motivational theories in psychology, as a framework by which to understand these effects. In this study, a classic brainstorming task is gamified with a leaderboard in order to explore this. Participants were randomly assigned to four classic levels of goal-setting (do-your-best, easy, difficult and impossible goals) plus a leaderboard populated with initials and scores representing identical goal-setting conditions. The presence of a leaderboard was successful in motivating participants to performance levels similar to that of difficult and impossible goal-setting, suggesting participants implicitly set goals at or near the top of the leaderboard without any prompting to do so. Goal commitment, a common individual difference moderator in goal-setting theory, was also assessed and behaved similarly in the presence of the leaderboard as when traditional goals were provided. From these results, we conclude that goal-setting theory is valuable to understand the success of leaderboards, and we recommend further exploration of existing psychological theories, including goal-setting, to better explain the effects of gamification.	Computers in Human Behavior	Q1

2019	Landers, R.N. Collmus, A.B. Williams, H.	The greatest battle is within ourselves: An experiment on the effects of competition alone on task performance	Purpose of Research: In the gamification literature, the causal effects of multiple game elements are typically confounded, but in this study, we tested the causal effects of the competition game element alone on brainstorming, a classic experimental context for studying human task performance. We furthermore explored intrinsic motivation as a motivational mediator and trait competitiveness as an individual difference moderator of the effect of competition on brainstorming performance. Principal Results: Adding competition to a brainstorming task improved both the creativity (d = 0.371) and quantity (7.72 additional ideas; d = 0.563) of brainstorming in comparison to a control group. Trait competitiveness did not moderate this relationship, such that a person's competitiveness did not change the effectiveness of competition. Intrinsic motivation also did not mediate the relationship between the game element and performance. Major Conclusions: Competition, even implemented as the sole game element in gamification, can improve human performance. This effect in this study did not depend upon a population containing highly competitive performers. Furthermore, we argue that the primary motivational effect of competition must have either occurred via an unconscious influence (i.e., increasing amotivation) or by impliticly creating extrinsic rewards for increased effort.	International Journal of Human Computer Studies	Q1

2014	Landers, R.N. Landers, A.K.	An Empirical Test of the Theory of Gamified Learning: The Effect of Leaderboards on Time-on-Task and Academic Performance	The theory of gamified learning provides a theoretical framework to test the impact of gamification efforts upon learner behaviors and attitudes, as well as the effect of these behavioral and attitudinal changes on learning. It does so by providing mediating and moderating processes linking specific game elements to learning outcomes. Aim. This article links specific game elements common to leaderboards (conflict/challenge, rules/goals, and assessment) with a focal learner behavior, timeon-task, by exploring educational research on competition and psychological research on goal-setting theory. Method. The mediating process of the theory of gamified learning is tested experimentally by assigning learners completing an online wiki-based project to a gamified version with a leaderboard or to a control version without a leaderboard. Leaderboard achievement was not tied to course grades. Results. Random assignment to leaderboards supported a causal effect. Students with leaderboards interacted with their project 29.61 more times, on average, than those in a control condition. Bootstrapping was used to support the mediation of the effect of gamification on academic achievement by this amount of time. Conclusion. The mediating process of the theory of gamified instruction is supported. Leaderboards can be used to improve course performance under certain circumstances.	Simulation and Gaming	
2018	Leclercq, Thomas Hammedi, Wafa Poncin, Ingrid	The Boundaries of Gamification for Engaging Customers: Effects of Losing a Contest in Online Co-creation Communities	Despite the increasing use of gamification mechanics to engage customers in firms' activities, the risks related to such use remain unclear. To address this knowledge gap, this research examines the impacts of losing a challenge, which is a phenomenon experienced by the majority of customers involved in gamified settings but underexplored in literature. We investigate the context of co-creation communities by combining two widely used gamification mechanics, competition and cooperation. Results from three laboratory experiments and one field experiment show that win/lose decisions weaken the benefits of gamification and, in the case of losing a competition, have negative impacts on customer experience and engagement. They also demonstrate that customers' levels of prior engagement with the community moderate the negative impacts of losing a competition. Supported by equity theory, this research questions the effectiveness of gamification mechanics, identifies their limits, and provides guidelines on how to properly implement them.	Journal of Interactive Marketing	Q1

2019	Lee, Byeong Cheol	The effect of gamification on psychological and behavioral outcomes: Implications for cruise tourism destinations	The purpose of this study is to empirically examine the effect of gamification on tourist psychological outcome and knowledge gain in the context of cultural heritage sites, which are popular cruise tourism destinations. A comprehensive literature review revealed the critical role of gamification in facilitating psychological (enjoyment, flow experience, and loyalty) and behavioral outcomes (knowledge gain) at cultural heritage sites. Using a field experiment, this study employed a gamified app as a manipulation. Atotal of 342 gamified app users (n = 165) or non-users (n = 177) were selected by stratified random sampling method from among college students majoring in tourism and cruise management in South Korea. After screening the data, a Hayes' PROCESS modeling technique was mainly utilized to test the proposed hypotheses based on 331 cases. The results showed that gamification had a strong influence on knowledge gain about cultural heritage attractions. On the other hand, gamification had negative effects on enjoyment and flow experience. More importantly, gamification had a negative indirect effect on loyalty toward cultural heritage attractions. These findings imply the usefulness of gamified apps to convey memorable and real-time information and knowledge to users in cultural heritage sites.	Sustainability (Switzerland)	

2019	Mader, Sebastian Bry, François	Fun and engagement in lecture halls through social gamification	The traditional lecture is a teaching format which offers students few opportunities for engagement turning them into passive listeners of the lecturers' presentations what negatively impacts on their learning. With audience response systems, that is technology-supporting classroom quizzes, breaks which reactivate the students can be introduced into the lecturers' presentations. This article reports on an audience response system coupled with a social gamification of quizzes based on teams: Each student is assigned to a team and the students' answers to quizzes contribute to their team's success. An immediate overview of team participation updated in real-time during the quiz and updated team standings after the quiz are displayed for everyone to see motivating students to participate in the quizzes. The contribution of this article is threefold: First, a team-based social gamification of quizzes aimed at boosting participation in quizzes and attendance at lectures, second, original technological tools supporting the proposed team-based social gamification, and third, a first evaluation demonstrating its effectiveness in a small course and a second evaluation suggesting that for use in large classes teams have to be built in a specific way. This article is an extended version of [32] which provides a deeper representation of related work, a more extensive description of the team component, an additional evaluation, and implications for the use of the team-based social gamification in large classes.	International Journal of Engineering Pedagogy	Q1

2019	Maltseva, Kateryna Fieseler, Christian Trittin-Ulbrich, Hannah	The challenges of gamifying CSR communication	Purpose: A growing number of research report positive effects of gamification, that is the introduction of game elements to non-game contexts, on stakeholder intentions and behaviors. Hence, gamification is proposed as an effective tool for organizations to educate their stakeholders about corporate social responsibility (CSR) and sustainability-related topics. The paper aims to discuss these issues. Design/methodology/approach: In this paper, the authors ask whether gamification can communicate matters of social and environmental concern. Based on three consecutive experimental studies, the authors show that there are boundary conditions to the effectiveness of gamified communication on stakeholder attitude, intention and behavior. Findings: The authors find positive, negative and insignificant effects of gamification on pro-environmental attitude, intention and behavior. Based on these ambiguous results, the authors conclude with a call for more rigorous forms of designing gamified experiences to foster stakeholder learning and highlight and develop several such future research and engagement opportunities. Originality/value: The study is the first to apply gamification to the context of corporate and in particular CSR communication. It is furthermore one of the first studies that actually research the effects of gamification empirically, and in controlled experimental conditions.	Corporate Communications	Q2

2019	Márquez-Hernández, Verónica V. Garrido-Molina, José Miguel Gutiérrez-Puertas, Lorena García-Viola, Alba Aguilera-Manrique, Gabriel Granados-Gámez, Genoveva	How to measure gamification experiences in nursing? Adaptation and validation of the Gameful Experience Scale [GAMEX].	Background: There has been an increasing amount of research in the last few years on the use of gamification in nursing. However, there is not yet a suitable measuring instrument that fully captures the emotional qualities that arise with the use of gamification. Objectives: To culturally adapt and validate the Gameful Experience Scale used among nursing students as well as understand their game experience. Design: The study was divided into two phases 1) cross-cultural adaptation and 2) validation of the scale and cross-sectional descriptive study. Settings: Faculty of Health Sciences at the University of Almeria, Spain. Participants: 226 students studying an undergraduate nursing degree. Methods: In the first phase, a cross-cultural adaptation was carried out using a forward-back translation, with the collaboration of a panel of experts. In the second phase, the corresponding analyses were performed, to measure the reliability and the validity of the instrument. Results: The Kaiser-Meyer-Olkin test that measures the appropriateness of the sample had a result of 0.875. Bartlett's sphericity test was significant ($X2(351) = 3755.142$, $p < 0.05$). A structure of 6 factors was confirmed. The total Chronbach α value was 0.855. In the analysis of the test-retest reliability, a correlation level of 0.89 was obtained ($p < 0.05$). The participants showed high scores in all the dimensions, except that of absence of negative effects. Conclusions: The adapted version of the scale showed good results in regards to reliability and validity, which indicates that it is an effective tool to be used to measure the game experience in nursing students' training.	Nurse Education Today	Q1

2020	Matthyssens, L.E. Vanhulle, A. Seldenslach, L. Vander Stichele, G. Coppens, M. Van Hoecke, E.	A pilot study of the effectiveness of a serious game CliniPup® on perioperative anxiety and pain in children	Introduction/Aim: Children experience important anxiety before surgery. Anxiety and pain are positively correlated. Serious gaming is a non-pharmacological intervention to prepare children and parents for an operation. We aimed to evaluate the effectiveness of the serious game CliniPup® on anxiety and pain in children undergoing ambulatory surgery. Method: A prospective randomized controlled pilot trial in 72 children aged 5 to 11 years old scheduled for day-care surgery (general surgery, dentistry, otorhinolaryngology, urology) was performed. Participants were randomly assigned into 3 groups: A (CliniPup®), B ("Empty game" without educational information), or C (no game, oral information at the outpatient clinic, current standard of care). Anxiety, pain, and behaviour were evaluated by validated instruments at six time-points: T0: baseline, T1: 1 week preoperatively, T2: at hospital admission, T3: before discharge, T4: 1 week postoperatively, T5: 1 month postoperatively. Results: After playing the game (T1), the estimated mean anxiety score (VASa) was lower in Group A (1.9 units) versus Group B (2.7 units). The estimated mean VASa at T1 for Group A was 2.6 units lower compared to Group C ($p = 0.003$). For Group B, VASa levels were 1.8 units lower than in Group C ($p = 0.045$). After correction for "surgery type", Group A continued to show a significantly lower VASa compared to Group C ($p = 0.044$). On the other time points, no difference in anxiety and pain were observed, nor in post-hospitalization behaviour. Conclusion: Children that played the CliniPup® game one week before surgery had a significant reduction in preoperative anxiety after playing the game, but not on the other time points. No differences on peri-operative pain were observed during the different time points. Type of Study: Randomized Trial. Level of Evidence: Level II.	Journal of Pediatric Surgery	Q1

2019	Mei, B. Yang, S.	Nurturing environmental education at the tertiary education level in China: Can mobile augmented reality and gamification help?	In the educational context, there currently emerges a growing research interest in using mobile augmented reality (AR) and the gamification concept to promote environmental education (EE). However, to date, scant attention has been paid to practically linking this approach to formal curricula at the tertiary level in China. Given the situation, we designed a geolocation-based mobile AR scavenger hunt to explore students' perception of embedding technology-enhanced and gamified EE in their language learning process. Ninety-eight first-year students, majoring in English at a Chinese university, were invited to participate in this study. In this game, students need to find the answers to 24 environment-themed questions phrased in English. Guided by prior technology acceptance research, we employed a mixed methods approach to capture participants' experience and perception of the process. The results show that this approach was positively perceived among the participants, for it could not only enrich their language learning experience but also promote their awareness of the environment. The findings offer insights into how EE can be purposefully integrated with tertiary education by leveraging current technological and pedagogical innovations.	Sustainability (Switzerland)	

2019	Miloff, Alexander Lindner, Philip Dafgård, Peter Deak, Stefan Garke, Maria Hamilton, William Heinsoo, Julia Kristoffersson, Glenn Rafi, Jonas Sindemark, Kerstin Sjölund, Jessica Zenger, Maria Reuterskiöld, Lena Andersson, Gerhard Carlbring, Per	Automated virtual reality exposure therapy for spider phobia vs. in-vivo one-session treatment: A randomized non-inferiority trial	Objective: This study compared the efficacy of a technician-assisted single-session virtual reality exposure therapy (VRET)for the treatment of spider phobia featuring low-cost consumer-available hardware and novel automated software to gold-standard in-vivo one-session treatment (OST), using a parallel group randomized non-inferiority design. Method Participants (N = 100)were randomized to VRET and OST arms. Assessors blinded to treatment allocation evaluated participants at pre- and post-treatment as well follow-up (3 and 12 months)using a behavioral approach test (BAT)and self-rated fear of spider, anxiety, depression and quality-of-life scales. A maximum post-treatment difference of 2-points on the BAT qualified as non-inferiority margin. Results Linear mixed models noted large, significant reductions in behavioral avoidance and self-reported fear in both groups at post-treatment, with VRET approaching the strong treatment benefits of OST over time. Non-inferiority was identified at 3- and 12- months follow-up but was significantly worse until 12-months. There was no significant difference on a questionnaire measuring negative effects. Conclusions Automated VRET efficaciously reduced spider phobia symptoms in the short-term and was non-inferior to in-vivo exposure therapy in the long-term. VRET effectiveness trials are warranted to evaluate real-world benefits and non-specific therapeutic factors accruing from the presence of a technician during treatment. ClinicalTrials.gov (NCT02533310).	Behaviour Research and Therapy	Q1

2020	Mitchell, R. Schuster, L. Jin, H.S.	Gamification and the impact of extrinsic motivation on needs satisfaction: Making work fun?	Despite the proliferation of gamification in the workplace, little is known about the contextual factors that contribute to its efficacy and impact on employee engagement and organizational productivity. Employing self-determination theory, this research investigates the impact of extrinsic motivation, such as social pressure or internalized guilt, on employees' psychological needs satisfaction and behavioral intention. A survey (n = 291) across multiple industries shows extrinsic motivation can decrease employees' autonomy and competence needs satisfaction, but when extrinsic motivation is internalized (such as through perceived personal value) it can support needs satisfaction, intrinsic motivation, and behavioral intention. For managers, these results indicate that beyond being enjoyable, sustainable gamification design should provide benefits that are meaningful to and valued by employees. While it is acknowledged that further research is required, this study provides a basis for deeper understanding of how gamification works as the first to empirically examine the role of extrinsic motivation.	Journal of Business Research	Q1
2020	Mullins, J.K. Sabherwal, R.	Gamification: A cognitive-emotional view	Elsevier Inc. Successful gamified systems engage players by eliciting their positive and negative emotions. However, prior literature provides little guidance on how to create emotional experiences through gamified design. This paper reviews work in psychology and neuroscience to examine the interactive processes of cognition and emotion and connect them to gamification. More specifically, it draws upon a model of the cognitive structure of emotions and the mechanics–dynamics–emotions framework for gamification to advance a cognitive–emotional view of gamification.	Journal of Business Research	Q1
2019	Ntokos, Konstantinos	Swords and sorcery: A structural gamification framework for higher education using role-playing game elements	Students attend the first sessions of your units and then disappear, some of them forever, and some of them have no clue what is going on or they work for other units' assessments. When it comes to providing them with formative assessment, it is not always well received as it is perceived as extra work. The purpose of this article is to define a gamification framework based on structural gamification that focuses on that weak part of your cohorts that do not engage as much, and it does that in a great way, as it embeds video game rules and role-playing into the curriculum. This is achieved through implementing game elements to the entire second-year cohort (N = 34) of computer game development students, in the unit 'Engineering Software Systems'. The goal is to motivate and engage the at-risk students of the cohort with lower activity, attendance and involvement in the unit.	Research in Learning Technology	Q2

2017	Oliver, E.	Gamification as transformative assessment in higher education	Gamification in education is still a very new concept in South Africa. Being a 21st-century invention, it has already established itself in the world within the environs of the corporate market, marketing, training and the social world. This article will first discuss gamification (and all its other designations) and its applications in general; thereafter, the focus will be on the application of gamification within the environment of education, and more specifically with an emphasis on assessment. The burning question for South Africa is whether gamification can enhance a module or course on the level of higher education so much that an educational institution cannot do without it anymore, knowing that we are working with students belonging to the 'Digital Wisdom generation'. This article would like to open the way for the implementation of gamification as a transformative online assessment tool in higher education	HTS Teologiese Studies / Theological Studies	Q1
2019	Oluwajana, Dokun Idowu, Adeleye Nat, Muesser Vanduhe, Vanye Fadiya, Samson	The adoption of students' hedonic motivation system model to gamified learning environment	The acceptance of gamified learning environment is rapidly becoming inevitable in educational learning environment. This gives a widespread popularity by deploying Gamification in to present day curriculum as part of a new educational technology tool. This study addresses perception and usage of gamified learning environment from hedonic motivation perspective through incorporating the Hedonic-Motivation System Adoption Model to Gamified Learning Environment. In this study, a model was developed and tested using a Structure Equation Modelling technique. The results show that perceived usefulness, perceived ease of use, enjoyment and control all have a significant positive relationship with behavioural intention of use and focused immersion which indicates that the acceptance of Gamified Learning Environment could serve as a new educational tool to expedite the improvement of pedagogical and instructional technology. Also, increases students' motivation and engagement in learning. On the contrary, we also found a negative relationship exists between enjoyment and focused Immersion. Possible research on the effect of enjoyment on focused immersion in gamification could be another area of concentration. In this study, aside from the introduction, the literature explains the adoption of the gamified learning environment and the hedonic motivation model at the end, the analysis and interpretation of our methodology were discussed.	Journal of Theoretical and Applied Electronic Commerce Research	Q2

2015	Oravec, J.A.	Gamification and multigamification in the workplace: Expanding the ludic dimensions of work and challenging the work/play dichotomy	Gamification approaches in the workplace are encountering strong and passionate critics as well as dedicated proponents as the very notions of games, play, and work are being reconsidered and reframed. Workplaces are incorporating increasing varieties of concurrent and emerging games; some of these games are directly linked to how employees are projected to produce value for an organization and are paid and promoted, while others can be recreational, educational, or even medical (involving health diagnosis or treatment). In effect, many workplace settings have become the platforms for multiple, sometimes interlocking sets of rules, enforcement mechanisms, and related gaming structures. "Multigamification" approaches explicitly recognize game-related complexities and interactions, and provide means for mitigating cognitive overload, character conflicts, and other concerns. Participants can be immersed in technology-enhanced games that infuse social, medical, and economic themes either as a part of strategic initiatives in gamification (and multigamification, as described in this paper) or through emergent and less-tightly structured efforts. The overall wellbeings of organizational participants may relate in some way in how they engage in specific games as well as to how they deal with multiple games either in sequence or simultaneously; one or more games can be designated as "work" and others as "play," sometimes reflecting traditional narratives that contrast labor deemed as "productive" with recreation. Developers can become active in exploring and tailoring games for specific workplace contexts, addressing issues of intergame compatibility, theme interaction, and synergy as well as participant overload. Multigamification can involve forms of competition among the games themselves as they compete for the limited attention of participants. This paper also addresses the challenging policy and design issues related to workplace games' effects on participant wellbeing. Emergence of nested and overlapping gaming spheres can increase the complexity of organizational life as well as expand its ludic dimensions.	Cyberpsychology	Q2

2016	Orduna-Malea, Enrique Martín-Martín, Alberto López-Cózar, Emilio Delgado	Metrics in academic profiles: A new addictive game for researchers?	This study aims to promote reflection and bring attention to the potential adverse effects of academic social networks on science. These academic social networks, where authors can display their publications, have become new scientific communication channels, accelerating the dissemination of research results, facilitating data sharing, and strongly promoting scientific collaboration, all at no cost to the user. One of the features that make them extremely attractive to researchers is the possibility to browse through a wide variety of bibliometric indicators. Going beyond publication and citation counts, they also measure usage, participation in the platform, social connectivity, and scientific, academic and professional impact. Using these indicators they effectively create a digital image of researchers and their reputations. However, although academic social platforms are useful applications that can help improve scientific communication, they also hide a less positive side: they are highly addictive tools that might be abused. By gamifying scientific impact using techniques originally developed for videogames, these platforms may get users hooked on them, like addicted academics, transforming what should only be a means into an end in itself.	Revista Espanola de Salud Publica	
2018	Osatuyi, B. Osatuyi, T. De La Rosa, R.	Systematic review of gamification research in is education: A multi-method approach	Gamification refers to the use of game mechanics and game dynamics in non-gaming environments and contexts. Gamification is increasingly gaining attention among system designers across various industries especially in education due to the benefits associated with its implementation. The adoption of gamification in information systems (IS) education is promising for engaging and motivating students to complete their degree programs. Call for research in this area is particularly on the increase in the IS field. Accordingly, we need to organize the aggregation of research in this area and use common terminologies to promote progressive research practice in the field. In this paper, we use a multi-method approach to systematically review existing research on gamification in IS education to identify common terminologies, identify trends in topics studied, highlight understudied areas, and, thus, present opportunities for future research. The multi-method approach combines classical systematic review method and social network analysis to provide additional insight into the knowledge structure of researchers involved in the gamification of IS education. This review also highlights possible interventions that can improve student retention in IS education through the design of effective gamified courses.	Communications of the Association for Information Systems	Q2

2016	Perryer, C. Celestine, N.A. Scott-Ladd, B. Leighton, C.	Enhancing workplace motivation through gamification: Transferrable lessons from pedagogy	Gamification is a term that has gained currency over the last few years. Gamification refers to the application of characteristics from digital games into non-gaming contexts. The concept under other names has attracted the interest of scholars for more than twenty years, due to its possible value in motivating students to learn. However few scholars have investigated ways in which the concept can be applied to building intrinsic motivation in employees. This is a particularly important area for research, as new generations who have been brought up with computer games become the dominant cohort within the workforce. This paper summarises the literature on game playing as a motivator, and outlines a variety of studied motivational responses to gamified systems as evoked from different categories of users, including students, consumers and employees. The paper goes on to discuss how the concept of gamification may interact with various theories of motivation, including Four-Drive Theory and Self-Determination Theory, and makes recommendations as to which gamification elements are relevant to the 21st century workplace, and may be effectively implemented in such a way that they can help to achieve personal and organisational objectives.	International Journal of Management Education	Q2

2019	Rapp, A. Hopfgartner, F. Hamari, J. Linehan, C. Cena, F.	Strengthening gamification studies: Current trends and future opportunities of gamification research	Gamification is now a well-established technique in Human-Computer Interaction. However, research on gamification still faces a variety of empirical and theoretical challenges. Firstly, studies of gamified systems typically focus narrowly on understanding individuals. short-term interactions with the system, ignoring more difficult to measure outcomes. Secondly, academic research on gamification has been slow to improve the techniques through which gamified applications are designed. Third, current gamification research lacks a critical lens capable of exploring unintended consequences of designs. The 14 articles published in this special issue face these challenges with great methodological rigor. We summarize them by identifying three main themes: the determination to improve the quality and usefulness of theory in the field of gamification, the improvements in design practice, and the adoption of a critical gaze to uncover side-effects of gamification designs. We conclude by providing an overview of the questions that we feel must be addressed by future work in gamification. Gamification studies would benefit from a wider use of theories to account for the complexity of human behavior, a more thorough exploration of the many opportunities coming from the world of games, and an ethical reflection on the use of game design elements in serious domains.	International Journal of Human Computer Studies	Q1

2019	Riaz, Malik Sarmad Cuenen, Ariane Janssens, Davy Brijs, Kris Wets, Geert	Evaluation of a gamified e-learning platform to improve traffic safety among elementary school pupils in Belgium	Children are highly represented in statistics relating to road traffic injuries and fatalities. There are multiple risk factors that together create an increased risk for children in traffic, some of the major reasons include children's inability to efficiently and actively scan the environment and look for information relevant to the traffic environment, inconsistent behavior, and less developed hazard perception skills. Traffic safety education is one of the most important means for improving knowledge and skills required for children to behave safely in traffic. This study evaluated a newly developed and gamified e-learning platform meant to promote traffic safety among elementary school pupils in Belgium. Participants in this study were from four grades of elementary school and voluntarily took part in the training. They followed a self-study program at home for approximately 15 min per week over a period of 5 weeks in total. The platform included four modules: traffic knowledge, situation awareness, risk detection, and risk management. For each of these modules, a set of photos and videos were used as stimuli and selected from a database of camera recordings of real-life situations. Half of each module consisted of familiar situations for the pupils (i.e., own municipality), while the other half of each module consisted of unfamiliar situations for the pupils (i.e., other municipalities). A fifth module, "the finale," contained a mix of the first four modules. In total, 44 elementary school pupils (9–13 years old) completed the program. During the first round of measurement (i.e., the first four modules), pupils performed significantly better in the traffic knowledge module when compared with the other three modules. Further, in comparison with unfamiliar situations, pupils scored significantly higher in familiar situations. During the second round of measurement (i.e., the fifth module), pupils achieved higher scores in the risk detection and risk management modules when contrasted to the first measurement. The effect of gamification elements is discussed and the results also indicate the type of traffic safety issues to be emphasized in traffic safety education for children.	Personal and Ubiquitous Computing	Q1

2019	Rocha, E.M. Pereira, G.M. Pacheco, D.	The role of the predictive gamification to increase the sales performance: a novel business approach	Purpose: This paper aims to examine the impact of predictive gamification, through a sales simulator game, as a strategy to minimize sales problems in organizations. Design/methodology/approach: This empirical study was executed in a large global company that produces and markets footwear for B2B and B2C markets. The company operates in more than 18 countries and adopts the gamification to train 7,600 sellers and 10,052 professionals directly linked to the sales area. The methodology adopted followed a qualitative and exploratory approach based on an in-depth case study analysis. Findings: Results indicated that the use of predictive gamification allowed mitigating future problems, in average, four months in advance of the arrival of the new products at the points of sale. The main findings included improvement in sales arguments, product knowledge and sales closure. The company assigns the results to the implementation of the gamification and the possibility to simulate the evaluation of the level of readiness of the sales force resources. For this, the following three primary variables emerged: adequate definition of training content, analysis of the learning process and simulation of store reality. Research limitations/implications: The authors introduced to the sales training literature the concept of predictive gamification. The predictive gamification allows anticipating and reducing future problems before the arrival of the new products in the market, improving the argument of sales, the knowledge about the products and the ratio of sales conversion of stores. Practical implications: First, the content design of gamification needs to be carefully projected before the simulator development, considering the target audience and its particularities. Second, the construction of evaluation activities needs to consider contexts, actions and results. Third, monitoring the paths taken by the seller in the simulator environment is requisite. Fourth, the analysis of the results of vendor responses in the simulator environment can be obtained through learning management system reports. Fifth, the development of game simulators with advanced technologies may be done with low investment. Originality/value: The findings have implications for the field vis-à-vis three main research gaps identified in the literature discussing gamification in sales training. First, the authors identified best practices from the application of gamification in sales training. Second, they showed the sales qualification processes, which can be improved by applying gamification. Third, they presented strategies of use of gamification as an approach allied to the training of sales professionals to generate enhanced sales results.	Journal of Business and Industrial Marketing	Q1

2017	Sakamoto, M. Nakajima, T. Akioka, S.	Gamifying collective human behavior with gameful digital rhetoric	This paper presents a design framework called Gameful Digital Rhetoric that offers a set of design frames for designing meaningful digital rhetoric that guides collective human behavior in ubiquitous social digital services, such as crowdsourcing. The framework is extracted from our experiences with building and developing crowdsourcing case studies. From a video game perspective, the paper has categorized our experiences into seven design frames to encourage collective human activity. This approach is different from traditional gamification, as it focuses more on the semiotic aspect of virtuality in the video games, not game mechanics; it helps to enhance the current meaning of the real world for changing human attitude and behavior through various socio-cultural and psychological techniques. Therefore, it is possible to discuss respective design frames for enhancing crowdsourcing by incrementally adding new digital rhetoric. The paper also presents how Gameful Digital Rhetoric allows us to guide collective human behavior in Collectivist Crowdsourcing; the design is explained through a scenario-based and experiment-based analyses. The paper then discusses how to design collective human behavior with Gameful Digital Rhetoric and how to identify the design's potential pitfalls. Our approach offers useful insights into the design of future social digital services that influence collective human behavior.	Multimedia Tools and Applications	Q2
2017	Sánchez-Martín, Jesús Cañada-Cañada, Florentina Dávila-Acedo, María Antonia	Just a game? Gamifying a general science class at university: Collaborative and competitive work implications	Gamification is a modern technique in science education that involves the participation of the student as a gamer in a playful structure. As a result of this activity, the student should be motivated for learning the specific academic content, becoming a player rather than a spectator in an increasing creativity environment. This work presents a gamification experience within prospective primary teachers in a General Science Classroom. A scoring game-based methodology was used for teaching Matter and Energy contents. In an effort for promoting collaborative dynamics rather than competitive ones in the entire group, a new variable was introduced once the game was started. It was called Game-Index and took into account the scoring of the whole class, similarly to H-Index. The results evidenced the need for these correcting measures in the gamifications processes, since a positive correlation amongst scoring and academic marks was confirmed, but also some kind of competitive-by segreggation inside the class group.	Thinking Skills and Creativity	Q2

2017	Shi, Victor Guang Baines, Tim Baldwin, James Ridgway, Keith Petridis, Panagiotis Bigdeli, Ali Ziaee Uren, Victoria Andrews, Daniel	Using gamification to transform the adoption of servitization	Increasingly, manufacturing organizations compete by developing product-service systems rather than offering products alone. To transform themselves into providers of advanced services, however, product-centric manufacturing firms need to overcome a range of barriers. While previous studies have highlighted the teaching/learning potential of 'gamification' (the use of ideas and techniques found in game-playing), the opportunities to harness this approach to help tackle such barriers have yet to be fully realized. Our study extends the debate by integrating established frameworks relating to emotional mechanics of gamification with the adoption of advanced services, arguing that such mechanics can facilitate and strengthen companies' transformation into advanced-service providers. Based on a systematic analysis of nearly 90 selected publications, we develop six conceptual propositions to explore how gamification can aid the transformation process. Our findings will help both practitioners and researchers apply emotional mechanics of gamification when seeking to address different hurdles hindering the development and provision of advanced services.	Industrial Marketing Management	Q1

2018	Sreejesh, S. Anusree, M.R. Ponnam, A.	Does game rules work as a game changer? Analyzing the effect of rule orientation on brand attention and memory in advergames	In advergames, marketers typically use a brand execution strategy of enacting the game rules and embedding the targeted brands in these rules to achieve the brand effectiveness. Despite the extensive use of this mode of gameplay, the current understanding in this area lacks clarity. In this context, the present research examines the importance of rule orientation as a mode of gameplay, its boundary conditions which strengthen this rule orientation, and the mechanism through which the application of rule orientation enhances gamers' brand attention and memory. Results from two experimental studies conclusively prove that use of rule orientation positively influences gamers' brand attention and memory. Results also suggest that rule orientation boosts the gamers' brand attention and memory when it is presented in a high brand-game goal congruent and in a high game autonomy mode. In addition, the results also support that rule orientation enhance the gamers' attention and memory when it designed as high brand-game goal congruent along with a highly brand integrated mode. The effect of rule orientation and its boundary conditions creates brrand attention and memory through the gamers' perception of the flow experience. Thus, the study findings suggest that marketers can use rule orientation along with high brand-game goal congruence, high autonomy, and high brand integration because this mode of gameplay creates a very strong form of brand attention and memory.	Computers in Human Behavior	Q1

2019	Tamplin-Wilson, Jay Smith, Rebecca Morgan, Jessica Maras, Pam	Video games as a recovery intervention for ostracism	Research has begun to explore the potential benefits of video games as intervention methods for a variety of issues. This study explores the role of video games in assisting the recovery from ostracism. Undergraduate volunteers (n = 117) were either included or excluded during a game of cyberball, after which their relational needs (self-esteem and belonging), as well as positive and negative affect were assessed. They were then randomly allocated to a video game condition (self-esteem enhancing, pro-social, or control) and following 5 min of play, needs and affect were reassessed. Participants' anti/pro – social responses were also recorded after administering the video game intervention. Results showed that all game conditions were successful in restoring psychological needs and affect scores following ostracism. Additionally, the pro-social game was the most successful in increasing positive affect following ostracism. There were no differences in pro-social behaviour scores between groups, with participants demonstrating neutral to social behaviour scores. This study is the first of its kind to demonstrate that games have the potential to restore needs and affect following ostracism. Exploring such low-cost and easily accessible intervention methods is crucial, given that ostracism is a prevalent issue with serious negative effects on wellbeing. This study adds to the growing research demonstrating the therapeutic benefits of video games, suggesting it is a valuable method of intervention for ostracism that needs to be further explored.	Computers in Human Behavior	Q1

2016	Tenório, T. Bittencourt, I.I. Isotani, S. Pedro, A. Ospina, P.	A gamified peer assessment model for on-line learning environments in a competitive context	Assessment (PA) offers a powerful solution that helps teachers in online learning environments to correct essays by distributing the workload among students. Nevertheless, the quality of the results in PA depends on good evaluations of reviewers. Thus, the main drawback for scaling up the use of PA is the presence of inadequate behaviours, such as being too harsh or too soft in the assessment, or even not offering a helpful feedback. This usually occurs due to the lack of motivation and engagement of students in the PA process. To deal with this problem, this paper proposes a gamified peer assessment model, where gamification elements are used to engage students in PA activities. Two experiments using the proposed model within an intelligent tutoring system called MeuTutor shows satisfactory outcomes. We verified that the average grade given by students to an essay are equivalent to those given by experts, but the time and costs to complete the assessments were largely reduced. Furthermore, the use of gamification helped to increase the amount of students' access to the system in 64.28%; increase in 10.53% the number of essays written and submitted; and improve the quantity and quality of assessments for each essay.	Computers in Human Behavior	Q1
2013	Terlutter, R. Capella, M.L.	The gamification of advertising: Analysis and research directions of in-game advertising, advergames, and advertising in social network games	The study presents a framework for the analysis of advertising in digital games. It reviews literature on in-game advertising, advergames and advertising in social network games. The framework distinguishes between stimulus characteristics of the game as well as of the advertising that lead to psychological responses toward the game and the brand and to actual behavior toward the game and the brand. It takes into consideration individual factors of the player and social factors surrounding the player. In addition, theoretical models of advertising perception in digital games and issues regarding regulation are addressed. Directions for future research in the area of advertising in digital games are provided.	Journal of Advertising	Q1

2019	Tornqvist, Dominicus Tichon, Jennifer	Motivated to lose? Evaluating challenge and player motivations in games	Players report losing some games can be as much fun, or more than winning. It is imperative to identify what motivates a player to pursue failure in games due to the importance of many games now used for educational and health purposes. The game's intended outcomes can be entirely undermined if players would rather lose than win the game. To achieve reliable predictions on the win/lose dilemma, we propose a new model of challenge, Dynamic Probability Response, which quantifies the degree and type of challenge. Many previous studies focus on individual differences in play. This study focuses on how different play motivations interact. Three conceptualisations of winning were tested against each other by giving players a mutually exclusive choice between challenge, gratuitous feedback from interaction (juice hypothesis), and compliance with visual cues denoting victory (game value adoption hypothesis). Each potential motivation for play was derived from psychological theory that is prevalent in the game design literature. Using a within-subject ANOVA, the three hypothesised motivations investigated were each individually supported. Some hypotheses about which motivations can disrupt the game's goal were supported. Others were not. The applications of these results to game and simulation design are discussed.	Behaviour and Information Technology	
2019	Trittin, Hannah Fieseler, Christian Maltseva, Kateryna	The Serious and the Mundane: Reflections on Gamified CSR Communication	We debate the strategic application of game elements to corporate messaging regarding societal and ecological concerns. We propose that gamified corporate social responsibility (CSR) communication is potentially well suited to create attention and involvement for corporate CSR initiatives. However, we argue that many gamification applications undermine their purpose and increase stakeholder suspicions about CSR. By debating the potential benefits and risks of gamified CSR communication, we aim to open the scholarly debate on the appropriateness of gamification in CSR.	Journal of Management Inquiry	Q1

2016	Tuten, T.L. Ashley, C.	Do social advergames affect brand attitudes and advocacy?	Advergames have been used for some time as a form of branded entertainment designed to engage prospective customers in a branded activity for an extended period of time. Increasingly, advergames are imbued with social qualities related to the rise in popularity of social media, especially social networking. Despite the popularity of social advergames, little is known about the brand benefits of incorporating social features into games. Moreover, while creativity has been studied in the context of more traditional advertising, less is known about its effects on brand development in the context of advergames. Although advertising creativity, as characterized by novelty and relevance, has been shown to impact advertised brands, it is not clear how creativity interacts with advergame socialness to affect brand development. To address these gaps in the literature, this paper reports on three experimental studies that compare the brand effects of advergames that enable social interactions to advergames that are not social. The results indicate that relative to non-social advergames, social advergames result in more positive game attitudes, attitudes toward the brand sponsor, and brand advocacy, particularly when advergames are novel. Finally, this article discusses implications for managers and directions for future research.	Journal of Marketing Communications	Q1

2019	van Roy, Rob Zaman, Bieke	Unravelling the ambivalent motivational power of gamification: A basic psychological needs perspective	Previous research on the interaction with game design elements in an educational setting has presented both desirable and undesirable outcomes but misses out on a theoretical and empirical explanation of the underlying psychological processes at work when interacting with gamified systems. This article aims at gaining an in-depth understanding of the power of gamification as shaping motivation based on the principles of basic psychological need satisfaction derived from Self-Determination Theory. This study is based on the qualitative analysis of 125 surveys (n = 40) and 2 focus group interviews (n = 7) gained throughout a 15-week university master course in which students voluntary interacted with a gamified platform. The results show the ambivalent motivational power of game elements in technology-supported learning environments—affording feelings of autonomy, competence and relatedness in some cases, thwarting them in others—with situational factors playing an important role in this process. These findings aid in understanding the workings of gamification and might help in explaining the mixed results about the effectiveness of gamification reported in previous literature. Conclusions and avenues for future research are reported.	International Journal of Human Computer Studies	Q1

2019	Vashisht, D. Royne, M.B. Sreejesh, S.	What we know and need to know about the gamification of advertising: A review and synthesis of the advergame studies	Advergames, or integrated brand messages within digital games, have received considerable attention from researchers and practitioners. Despite increased use of advergames as a brand promotion strategy by a range of well-known brands, limited understanding exists about a number of issues related to the effective use of such games. This paper aims to critically review the literature on advergames by performing a detailed analysis of existing research in this area and propose an organizing framework. Based on this framework, the authors discuss key issues with current understanding and propose important questions for future research. Design/methodology/approach: This literature review follows Webster and Watson's (2002) concept-driven systematic review methodology elaborating on the key antecedents and consequences identified in advergame studies (what we know: current knowledge), followed by the discussion of key factors that should be investigated as antecedents and consequences (literature gaps). Findings: This paper presents a review and synthesis of advergame studies based on Terlutter and Capella's (2013) integrated marketing communication framework. It identifies game, individual and social factors and suggests how these factors could affect a consumer's brand-related cognitive, attitudinal and behavioral responses. The authors further propose an advergame framework that identifies two different "unit of analysis" (antecedents and consequences of game factors and antecedents and consequences of individual and social factors), which can be used by scholars to center their research efforts in a more detailed fashion. Research limitations/implications: Research questions posed in this literature review indicate that future research in the area of advergames should focus on investigating the effects of various game, individual and social factors on consumers' cognitive, affective and behavioral responses. Practical implications: The advergame framework provided here provides firms with a guide to the factors that may affect their consumers' cognitive, affective and behavioral responses and helps them in developing effective advergames. Originality/value: The paper provides a comprehensive review of the advergame literature that has not been done before and develops a general advergame framework that can be applied in all contexts and will guide future studies in the area. Overall, the study helps the researchers to identify critical issues and concepts related to advergames and shapes future research in the field.	European Journal of Marketing	Q1

2019	Vegt, Niko Visch, Valentijn Vermeeren, Arnold De Ridder, Huib Hayde, Zsolt	Balancing game rules for improving creative output of group brainstorms	This article describes a user-centered design experiment investigating positive and negative effects of adding game rules to brainstorms. We studied effects on brainstorm output and user experience and behavior. A coin-based gamification was developed with rules intended to improve brainstorm output in relation to quality and quantity of ideas. However, the invasiveness of a gamification can be expected to affect users both positively and negatively. To find an optimum between positive and negative effects of gamification invasiveness, we tested 5 different rule-sets with varying quantity and quality of rules. The results demonstrated that game rules stimulating competitive game behavior improved the quantity and quality of brainstorm output. Yet the invasiveness of the gamification also hindered this positive effect, due to discussions about rules and mandatory game behavior. From these results we deduced 3 types of invasiveness evoked by the rules' qualities: a) governing rules led to negative cognitive invasiveness, b) forcing rules caused positive as well as negative behavioral invasiveness, and c) adding coins may have led to positive affective invasiveness (i.e., a playful attitude). We conclude our study with recommendations on designing and researching gamification invasiveness in real-life contexts.	International Journal of Design	Q2
2019	Zimmerling, Eric Höllig, Christoph E. Sandner, Philipp G. Welpe, Isabell M.	Exploring the influence of common game elements on ideation output and motivation	Despite the widespread and increased usage of idea contests and, within these, gamification elements, scarce data exist on the effects of utilizing gamification elements to increase performance and motivation in idea contests. We therefore investigate the incentive effect of gamification elements on the output of online idea contests in a field experiment with 446 individuals across five treatment groups. Our results show that game elements can increase quantitative performance but not the motivation of participants or the quality of ideas. Additionally, we do not report a crowding-out effect. We therefore conclude that gamification is suited to improving the performance of effortless tasks, such as commenting, but it should not be the main driver behind improved idea quantity or quality levels. The results are in line with recent findings in the psychology literature suggesting that external incentives positively influence quantity but have less influence on the quality of performance.	Journal of Business Research	Q1

2019	Zvarych, I. Kalaur, S.M. Prymachenko, N.M. Romashchenko, I.V. Romanyshyna, O.Ia.	Gamification as a tool for stimulating the educational activity of students of higher educational institutions of Ukraine and the United States	This study has experimentally tested how the introduction of simulations, adapting the experience of higher educational institutions of the United States, including the elements of gamification, in the training course Professional Foreign Language stimulates the educational activity of students at higher educational institutions of Ukraine students' educational activity through the involvement and creation of activity for constructive competition and cooperation, stimulation of interests and motives, maintaining cognitive attention of students and encouraging feedback. To carry out this research, a script, a methodology for arranging the simulation Coffee Import-Export Procedure was developed. To process the collected statistical information, Covariance-based Structural Equation Modeling (SEM) software, including two-way ANOVA for Mixed Measures, was used, and the Textalyzer software was used to process the answers of the experimental group's students to the open-type questions. It was found out, that the simulation model Coffee Import-Export Procedure with elements of gamification develops value-motivational, cognitive and activity-reflective components of educational activity of students, develops self-education skills, which are included in the list of key life and career Skills of the 21st Century, moving the formation of competences of self-education from minor to dominant positions, forms the model of future professional activity of students. The scientific and practical results of this research can be used in the practice of corporate training of company's personnel, professional training of future specialists in management, international business, organizational psychology, law, etc., as well as for the organization of professional training for people with limited access to higher professional education or for those who needs retraining.	European Journal of Educational Research	Q1