Teacher Online Educational Resource Search in Education System Context

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Abstract

School teachers around the world use online resources in their teaching. The education systems in which teachers work directly impact their freedom to choose, adapt, and use resources in their classes. This, in turn, influences teachers' information interactions involved in lesson planning and resource preparation, but few studies have investigated this relationship. Based on a semi-structured interview and observation study with 15 school teachers working with the Scottish Curriculum for Excellence, a process model is proposed to describe teacher tasks and strategies for finding, using, and sharing educational resources. This study addresses the influence of the education system context and considers implications for design of search systems that support online educational resource search by school teachers. A supplementary open licensed dataset can be found at https://osf.io/a2xs8/.

CCS Concepts

• **Information systems** → **Task models**; **Web and social media search**; • **Human-centered computing** → **Social content sharing**.

Keywords

Information Seeking & Behaviour, Information Interaction, Materials, Discoverability, K-12 Education, Schools

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1 Introduction

School teachers engage in a wide range of work tasks. Recent large-scale international surveys [3, 9, 19, 30] show that only about half of teachers' weekly working hours are dedicated to classroom teaching. Lesson preparation is usually the most time-consuming task outside of the classroom.

In many education systems and subject areas, preparing educational resources, such as lesson plans, activities, presentation slides, and worksheets, is a significant part of lesson preparation. With the ubiquity of information and educational resources available online, school teachers often face a choice between "reinventing the wheel" (making their own educational resources from scratch) and "finding a needle in a haystack" (looking for existing educational resources to reuse, which can be time consuming to find).

Search engines can make it easier to find online educational resources, facilitating their reuse. In a 2012 survey [22] with 2462 teachers in the United States, 99% of the respondents said they use search engines to find information online, with 84% looking for engaging student resources and 80% looking for resources to help create lesson plans at least once a week. However, most search engines are not adapted for teachers' specific needs. Järvelin et al. [14] view search as a tool to accomplish a task within a user's work context and advocate for development of information systems considering domain-specific tasks, needs, and challenges. Understanding teachers' work context is important to ensure that tools like search engines help, rather than exacerbate, teachers' work.

The diversity of teachers' contexts in different education systems introduces an additional layer of complexity. Curriculum flexibility and autonomy are major factors in lesson planning and preparation practices. The OECD [21] define curriculum flexibility as "how adaptable a curriculum can be to changing educational contexts or different student needs" and curriculum autonomy as "the extent to which different actors can exercise their control and decision-making over curriculum flexibility". Even within neighbouring regions, policies and practices can differ significantly, for example, in the United Kingdom, flexibility is rated low for England's National Curriculum and high for the Curriculum for Wales [21].

The Scottish Curriculum for Excellence is an interesting case study context because of its variable flexibility. It affords teachers lots of autonomy in planning their own lessons and choosing resources for younger learners in the Broad General Education phase but switches to standardised assessment for learners in Senior Phase, resulting in much more streamlined lesson planning and resources.

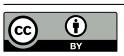
This study investigates the following research questions:

RQ1: What are the educational resource search behaviours of teachers working in a flexible education system?
RQ2: How does the education system influence teachers' information interactions in educational resource search?

2 Background and related work

2.1 Work and search tasks

In the context of this study, a work task is a "separable part of a person's duties to her/his employer" [5]. The work task of interest is teachers' lesson planning and preparation, and especially the narrower subtask of resource preparation. Here, an educational resource is interpreted broadly as any artifact (tangible or conceptual)



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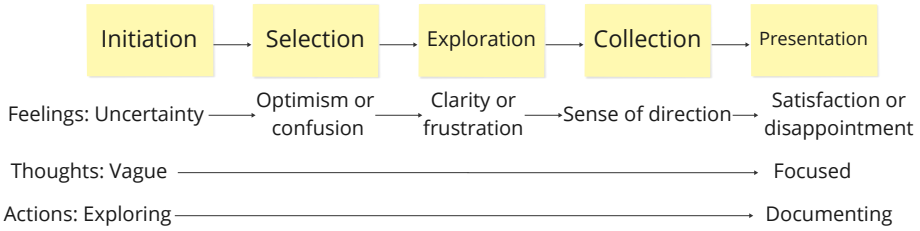

Figure 1: Information Search Process from Kuhlthau et al. [15]

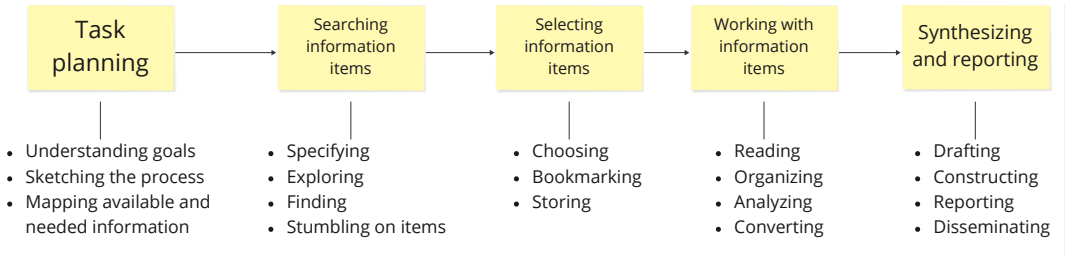

Figure 2: Task-Based Information Interaction Model from Järvelin et al. [14]

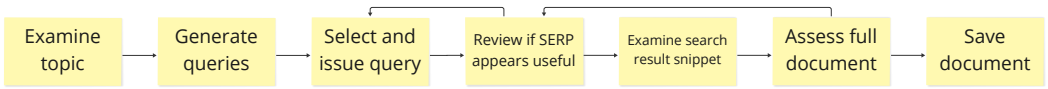

Figure 3: Complex Searcher Model from Maxwell [16]

used to aid teaching, although this study focuses mainly on digital, online educational resources. Information seeking tasks are a part of resource preparation when teachers choose to look for existing resources, they involve figuring out what information would be useful and finding that information. Information search tasks are more granular subtasks of information seeking tasks, which involve direct interactions with a search system. Information interaction tasks encompass information seeking and search tasks, and also include using found information and synthesising it into outputs to address the goals of the original work task [14].

2.2 General information interaction models

Previous research proposes several relevant information interaction, information seeking, search process, and information retrieval models. Soufan et al. [25], in their literature review of information processes, show that many different models are compatible despite differences in terminology, and so here they are presented under the broad umbrella of "information interaction" models.

The classic Information Retrieval model [23] consists of a user, who formulates queries to express their information need, and a search system, which finds documents that match user queries. This approach, sometimes called "directed searching" is complemented by "browsing" [18], another search model supported by systems that allow users to navigate by links between documents, usually linking to related results. Ingwersen and Wormell [13] argued that serendipity plays a significant role in search where users have unclear information needs, which implies that models like browsing are more useful when a user is unsure about what they are looking for, while directed searching is more useful for quickly finding if a desired document exists in a given database or recalling a known item. Bates [1] critiques the classic directed searching model for explaining only a small subset of real life searches – it assumes that users have unchanging information needs and only need to find one best set of results – but in reality, users usually combine useful information from many documents ("berrypicking") and their information needs may change over the course of a search session ("evolving search"). According to Bates [1], the models of directed search, browsing, and berrypicking/evolving search are not exclusive, but may co-occur or users may switch between them during a search session.

The widely used and validated Information Search Process [15] extends the evolving search concept and posits six stages of search: initiation, selection, exploration, formulation, collection, and presentation. Users begin by defining the scope of their task and choosing topics of interest. They explore available information about these topics, learning more about them in the process, and then move on to focused searching. In focused search, users have a clearer sense of direction, they gather relevant search results, and eventually synthesise found information into something to address their initial task. This is summarised in Figure 1.

Another similar model by Järvelin et al. [14], Task-Based Information Interaction (TBII), shows a user's journey from task planning

to synthesizing and reporting (see Figure 2). It includes more detail about subtasks for each of the information interaction tasks. This model offers a useful starting point for defining domain-specific information processes.

The Complex Searcher model by Maxwell [16] (see Figure 3) is a more granular version of berrypicking that focuses on search tasks. According to this model, users examine a topic of interest, come up with several potential queries to investigate it, and then try them one by one. With each query, they first quickly skim the search results page (SERP) to see whether it looks promising, and if not, issue another query. If it does look promising, users review search result snippets and only review those documents whose snippets seem relevant. This model highlights changes in modern search systems – search result previews, summaries, and snippets play a major part in the search process.

These general information interaction models provide a useful foundation for framing domain-specific models for teachers' lesson planning and educational resource search.

2.3 Teacher educational resource search models

Previous quantitative survey studies show some subtasks involved in lesson planning and preparation. In a 2012 survey [22] with middle and high school teachers (N=2462, United States), 84% of the participants said they search for engaging student resources online, 80% look for material to help create lesson plans, 80% receive email newsletters and alerts about updates in their field, 57% search for the latest research in their field, 45% interact and share advice with other teachers, and only 18% use social networking sites like Twitter to exchange ideas with other teachers at least once a week. Beyond searching for information, 51% of the participants indicated they take material they find online, such as songs, texts, or images, and remix it into their own creations. To find information, 99% of the participants used search engines (and 90% named Google as their search engine of choice), 97% used video sharing sites like YouTube, and 87% used Wikipedia.

Another survey from 2014 by De Los Arcos et al. [7] on how K-12 educators use Open Educational Resources (OER; resources available under open licenses that allow anyone to retain, revise, reuse, remix, and redistribute them [31]) shows that 83%-94% of the participants (N=657, international) adapt OER to fit their needs, which corroborates previous studies and highlights that teachers rarely use online educational resources "off the shelf" as they are. Videos, open textbooks, and images were the most commonly used types of OER. 71%-86% used YouTube to find OER. Major selection criteria were whether a resource was created by a reputable person or institution, whether a detailed description was included, and whether the content was relevant to educators' particular needs and interests. For more than half of the respondents, finding resources of sufficiently high quality, finding suitable resources in their subject area, not having enough time to look for suitable resources, and not knowing where to find resources were the main challenges.

Reflecting growing adoption of social media, a 2018 study [12] found that K-12 teachers (N=154, United States) frequently used YouTube, online newspapers, and Pinterest to look for educational resources. Social networks like Pinterest, Facebook, and Twitter were often used to look for lesson plans, forms, and templates.

These quantitative studies highlight some teachers' tasks (searching for materials, adapting materials), common places to look (search engines, video sharing sites, Wikipedia, social media), and strategies (email newsletters, judging resource credibility through the publishing author or institution). However, surveys require presupposing the possible range of tasks and their findings are thus limited to researchers' pre-determined scope of the educational resource search process. Qualitative data gathering and analysis are required for more open-ended and deeper insights.

Burron and Pegg [4] conducted an empirical investigation of elementary pre-service science teachers' search, evaluation, and selection of online educational resources (N=18, Canada). They distinguished two main types of teacher search behaviours: "Web-searching" – querying search engines or databases and "browsing" – exploring educational databases by following links (equivalent to directed searching and browsing from early information retrieval research). Through observing participants, who were looking for resources for their class assignment, the researchers noted that the participants saved much fewer resources than they viewed, indicating a distinctive step of evaluation before selection. Common participant search strategies included: rewriting search queries to narrow down search results, using specific terms from curriculum documents (such as "wheels and levers", the name of a science unit), and switching from Web-searching to browsing after finding an initial resource through a keyword search and then following links to related resources. When educational resource databases yielded too few or too many search results, most participants switched to searching on Google or YouTube instead. The researchers predicted that teachers in general would prefer resources that would be easy to modify, and that pre-service teachers would, due to their lack of experience in teaching, prefer more complete learning resources and those that could be used in multiple educational contexts. In post-analysis, these predictions were confirmed, although the participants also selected many non-modifiable resources, most of which were videos (judged as "non-modifiable" due to the difficulty of video editing). The main resource selection criteria appeared to be whether the resources looked fun, engaging, and colourful, whether they were age-appropriate for the target audience, and whether they were aligned to curriculum outcomes. Burron and Pegg [4] point out that their study participants needed to search for something they did not have much experience with and therefore sometimes lacked the vocabulary of terms to look up. Although all participants rated their internet search skills highly, most only used simple search queries and their searches were inefficient – only about 30% of searching time led to saved resources.

Bortoluzzi and Marenzi [2] interviewed experienced English language teachers (N=6, Italy) about their experiences and recorded think-aloud task-based scenarios about searching for educational resources online. The study participants themselves identified 3 distinct search contexts they may be in at work – searching for class activities or materials for learners, searching for professional development resources for own learning, and searching for general background information to expand personal knowledge. The latter two contexts correspond to search for learning and search as learning [28]. The researchers grouped observed teacher search terms into 4 categories: 1) general topic names (e.g., "geometry and art", "Noah's ark", "Nelson Mandela"), 2) familiar website names

Burron and Pegg [4]	**Browsing** • Following links to similar resources	**Searching** • Rewriting queries • Using curriculum terms	**Evaluating** • Age appropriateness • Engaging looks • Alignment to curriculum outcomes	**Saving**		
Bortoluzzi and Marenzi [2]	**Collaborating** • Sharing resources with colleagues • Digital-word-of-mouth recommendations	**Searching for class** • Querying for topic and source	**Evaluating** • Source credibility • Author credibility • Pedagogical usefulness • Colleagues' opinions	**Adapting** • Getting inspiration • Contextualising	**Searching for professional learning**	**Searching for personal development**
Cortinovis et al. [6]	**Collaborating** • Contributing • Communicating	**Searching** • Filtering • Expansion • Navigation • Orienteering	**Using** • Lesson development • Lesson delivery	**Repurposing** • Modifying • Documenting	**Publishing**	

Table 1: Comparative summary of teacher tasks and strategies from [2, 4] and OER task taxonomy from [6]

(e.g., Insegnanti 2.0, WebEnglish teacher, Glogster), 3) websites of reputable organisations (e.g., United Nations, BBC Education), and 4) social platforms used for professional purposes (e.g., Facebook, Twitter, Pinterest). Many searches relied on familiar websites, other teachers' blogs, and social media groups, which the authors termed "digital-word-of-mouth" sharing. A surprising finding was that the study participants had limited interest in specialised educational resources such as lesson plans, worksheets, and interactive learning websites. Instead, most searches were focused on resources not originally created for educational purposes. When selecting resources, teachers evaluated the credibility of sources by authority and prestige (highly credible sources were government websites, BBC, and academic institution sites) or by colleague recommendations (offline or on social media). Some participants mentioned they frequently exchange resources with colleagues and look out for others' reactions and feedback. When thinking about suitability and usefulness of resources, the teachers focused on processes and practices – how resources would contribute to learning, improvement, and empowerment – rather than the resources themselves. Adapting found resources (sometimes editing and sometimes just getting inspiration and ideas without direct reuse) was a fundamental step for both educational and generic resources. Teachers engaged critically with all found resources and said they almost always adapt what they find before use in class. The participants also said they do not re-post adapted materials online.

Cortinovis et al. [6] investigated the discoverability of OER for school teachers (N=10, Italy). The authors built on Information Foraging Theory to distinguish two main search strategies used by teachers: lookup (keyword search, known-item search) and discovery (exploratory search or "Query By Example"). From a literature review, they developed an OER search task taxonomy and verified it by conducting a survey and interviews. All participants were teaching at upper secondary level or higher. Cortinovis et al. argued that discovery is not well supported by existing tools and used a design-based research approach to prototype a browser plug-in "Discoverer", which allows users to find similar open educational resources to selected search results, starting from a Google search results page. This received positive feedback in the final evaluation with 29 educators and 7 OER experts. Participants especially liked that the tool was integrated with Google, instead of replacing familiar tools with new ones. Some participants challenged the relevance of the tool to their context — Discoverer's functionality was closely tied to learning outcomes, which are not commonly used in Italy.

Previous qualitative studies of teacher lesson planning and resource preparation share common sub-tasks like searching for resources for class, evaluating resources, adapting and repurposing, and collaborating with others. While some studies note sub-tasks that were missing from others, such as browsing and focused searching, saving resources, searching for professional learning and for personal development, and publishing resources, the sub-tasks are not contradictory and could be integrated in a general process model. To the best of authors' knowledge, there have not been any studies focusing on the role of the education system context in teachers' educational resource search, although some of the previous findings suggest its importance, e.g., Burron and Pegg [4] found that teachers used curriculum-specific terms in searches and looked out for alignment to curriculum outcomes and Cortinovis et al. [6] found that Italian teachers did not find features about learning outcomes relevant.

The prior research findings are summarised and contrasted in Table 1. This study builds on previous studies by investigating the tasks and strategies employed by teachers in a different context (in this case, the Scottish Curriculum for Excellence) and unpacking how the characteristics of the education system influence teachers' information interactions in educational resource search.

2.4 Work task context

2.4.1 Scottish Curriculum for Excellence. In Scotland, the Curriculum for Excellence (CfE) is the national curriculum for all Scottish

public schools. The CfE comprises 7 years of primary school (P1–P7) and 6 years of secondary school (S1–S6). Education levels are subdivided into phases:

- *Early Learning and Childcare* – this phase includes all early education and childcare programmes in Scotland. Children in this phase are typically aged 2–4.
- *Broad General Education* – this phase encompasses 10 school years, from P1 to S3. Pupils usually start primary school aged 4 or 5 and move on to secondary aged 11 or 12.
- *Senior Phase* – this phase usually spans school years S4–S6 (sometimes S3 – S6). The two final years, S5 and S6 (where pupils are usually aged 16 or over and are legally considered young adults) are optional.

The Broad General Education (BGE) phase includes eight curriculum areas: expressive arts, health and wellbeing, languages, mathematics, religious and moral studies, sciences, social studies, and technologies. Each of the areas are structured by the Experiences and Outcomes framework (informally called the "Es and Os"), which provides indicative guidance of general skills and knowledge pupils should learn in each subject area at different levels, and accompanying Benchmarks, more detailed guidance on expected abilities and knowledge at each level. Pupils are assessed internally by their schools at BGE Early Level (up to P1), BGE First (P2–P4), BGE Second (P5–P7), National 3 (S1–S3), and National 4 (S1–S3) levels [8][1]. The flexibility in when assessments must be passed allows students in the same school year to progress through the framework at different paces.

In Senior Phase (SP), pupils are assessed by nationally standardised examinations or coursework rather than by individual schools. Assessments are organized at National 5 (S4–S6), Higher (S5–S6), and Advanced Higher (S6) levels.

2.4.2 Stakeholders. Teachers in Scotland are not one homogenous group. Early Years and primary teachers are usually generalists while secondary teachers are usually subject specialists. There are also different teacher roles: classroom teachers, short term supply teachers, additional learning support teachers (or pupil support workers), and school leaders (or head teachers). Teachers have different seniority levels: probationers, main grade teachers, chartered teachers, lead teachers, principal teachers, deputy head teachers, and head teachers. The differences in different teachers' responsibilities naturally lead to differences in how they need to prepare for lessons.

Many other stakeholders are involved in school education, such as Education Scotland, General Teaching Council for Scotland (GTCS), Quality Improvement Officers, local authorities, youth work agencies, employers, and others [20], but they are outside the scope of this study.

2.4.3 Teachers' working time. Scottish regulations require school teachers to work 35 hours per week, with maximum 22.5 hours for class contact teaching and guarantee an allowance of no less than 1/3 (=7.5h) of class teaching time dedicated to preparation and correction [24]. A 2024 time use diary study with 1834 teachers employed across all 32 local authorities in Scotland [11] found that, in practice, classroom teachers spent between 19 and 23 hours on face-to-face teaching (mean average range across roles, except for deputy head teachers and head teachers who, on average, spent less than 10 hours teaching per week). After teaching, teachers spent between 10 and 14 hours on preparation and admin tasks per week (mean average range across all teacher roles). For classroom teachers, planning and preparing lessons constituted over 40% of time spent on preparation outside of class (although it was less than 20% for deputy head teachers and head teachers). On average, teachers reported spending 11.39 hours working outside of the contracted 35 hours each week in the mornings before work, evenings, and weekends. Out of these hours, the most significant tasks were planning and preparing lessons (mean=20.59%, SD=16.78%), preparing resources (mean=17.65%, SD=15.34%), and marking and providing feedback to pupils (mean=13.71%, SD=17.08%).

These figures show that Scotland follows a similar pattern to what previous studies [3, 9, 19, 30] found in other countries – outside of classroom teaching, teachers spend the majority of their working time on lesson and resource preparation. The study findings also highlight that a significant portion of this time is outside of official working hours, which underscores the importance of facilitating these tasks and minimising burden on teachers.

3 Interview and observation study

In this project, a qualitative interview and observation study with school teachers, teacher trainees, and other school staff was carried out to investigate how teachers search for, use, and share online educational resources. All interviews and data analysis were carried out by one researcher.

Consenting participants were first asked to complete a pre-study questionnaire about their background and teaching responsibilities. Then they joined a 1-hour 1:1 online meeting with a researcher, which involved a semi-structured interview about finding, using, and sharing online educational resources and some dynamically adapted search tasks while screensharing. At the end of each meeting, participants were asked some closing interview questions about Open Educational Resources and had the opportunity to comment on anything else that may have been missed during the tasks. These directed questions were kept for the end to avoid biasing the participants' responses. The interview script is included in Appendix A.

Meetings were recorded for transcription and revision. The interview discussions elicited information about teachers' views, practices, and perceptions, while the observations of search in real time with screensharing allowed inspecting how teachers search for online resources in practice, rather than in a hypothetical scenario.

The study plans were approved according to the University of Edinburgh Informatics Research Ethics Process.

3.1 Participants

Participant recruitment and interviewing was carried out during August–December 2022. Due to teacher availability constraints and lack of funding for the study, convenience sampling was the only suitable recruitment option. Participants were contacted by emailing over 2000 public schools in Scotland, publishing calls for participation through GTCS, Education Scotland, Data Education for Schools newsletters, posting on teacher groups on Facebook and

[1]This is a slight oversimplification, as there are some standardised assessments in Broad General Education [17], but they are not prevalent.

ID	Experience (years)	Interviewed	Scenario role	Scenario class (level)	Subject
#3	6–10	Yes	Classroom teacher	P4 (BGE First)	English literacy
#4	More than 20	Yes	Private tutor	N/A (Higher)	Chemistry
#5	More than 20	Yes	Supply teacher	P7 (BGE Second)	English literacy
#6	6–10	Yes	Classroom teacher	S1 (BGE Third)	German language
#7	6–10	Yes	Further Education lecturer	N/A (SCQF Level 5)	Biology
#8	More than 20	Yes	Classroom teacher	P4 (BGE First)	English literacy
#9	2–5	Yes	Supply teacher	P4 (BGE First)	History and art
#10	More than 20	No	–	–	–
#11	More than 20	Yes	Support teacher	S1 (BGE Third)	Mathematics
#13	More than 20	Yes	Classroom teacher	S5 (Higher)	Physics
#14	More than 20	Yes	Classroom teacher	P5-6-7 (BGE Second)	Science
#15	11–20	Yes	Classroom teacher	P2-3 (BGE First)	Life Under Water
#16	2–5	No	–	–	–
#17	More than 20	Yes	Support teacher	P7 (BGE Second)	Mathematics
#18	6–10	No	–	–	–
#19	11–20	Yes	Classroom teacher	P4 (BGE First)	Platinum Jubilee
#20	11–20	Yes	Classroom teacher	S4 (National 5)	Economics
#21	More than 20	Yes	Classroom teacher	P2-3 (BGE First)	Rainforests
#22	0–1	No	–	–	–

Table 2: Individual participant backgrounds

Local Authorities	Schools	School locality	School SIMD statistics[2]
Aberdeen	9x public state schools	3x large cities	maximum: 10
Aberdeenshire	2x public faith schools	7x accessible towns	minimum: 3
Argyle and Bute	2x independent schools	1x accessible village	median: 5
Edinburgh	2x N/A	2x remote villages	mean: 5.8
Fife		2x N/A	sample standard deviation: 1.9
Midlothian			
Moray			
Scottish Borders			
West Lothian			

Table 3: Summary of participant backgrounds (pooled to protect anonimity)

X/Twitter, and personal introductions through academic networks. 19 participants filled in the participation form, of which, 15 were able to participate in interviews.

Participants #1 and #2 were pilot test participants excluded from data collection. Participant #12 declined consent to participate in the study and hence no data was collected. All but one of the participants' schools followed the Scottish Curriculum for Excellence (Participant #7 taught a curriculum based on Standard Grade, the previous system, and taught at SCQF Level 5 which is equivalent to National 5 in the CfE). Most participants taught at multiple levels from BGE Early Level to Advanced Higher, and across a range of subjects. 17 of 19 participants (and all those interviewed) indicated that they search for resources online once a week or more. Each interview was mostly centred around one particular class and topic that the participants were teaching or had recently taught.

[2]Based on Scottish Index of Multiple Deprivation 2020 decile data for school post code areas

3.2 Data collection

All interviews were conducted online using Microsoft Teams and automatically transcribed by Microsoft Stream. The meeting recordings and automatically generated transcripts were downloaded and set up in ATLAS.ti 9, a qualitative data analysis program. Participant pre-study questionnaire responses were also added to ATLAS.ti 9. Observations from screensharing recordings were summarised as inline text comments in the transcripts.

Participants consented to their data being shared openly, subject to anonymisation. Some participants requested parts of the discussion to be removed from the records. Relevant parts of transcripts were deleted such that it is not possible to identify what was removed. This did not constitute a significant part of collected data and is not a limiting concern of the study.

Although all efforts have been made to make the transcripts as anonymous as possible, a small risk of re-identification from contextual details remains. This was deemed ethically acceptable due to the benefits of including relevant context in the data and low risk of

harm to participants if identified. Place and institution names and other identifying details were removed, specific dates and numbers were approximated, and local authority names were replaced with randomly assigned identifiers. All these edits are indicated in the transcripts. Any "higher risk" passages that could potentially cause participants harm if identified were removed without indication from original transcripts and collated together in a pooled and shuffled set of quotes. These do not constitute a significant part of collected data.

The original meeting recordings and pre-study questionnaires were deleted, but anonymised background information and coded interview transcripts are made available as an open licensed dataset at this link on Open Science Framework. The dataset also includes supplementary materials: study ethics documents, individual form responses, project codebooks, and a compilation of links and descriptions of tools, platforms, and communities mentioned in the interviews. Researchers are welcome to reuse the dataset and conduct their own secondary analyses.

3.3 Data analysis

Iterative coding. The transcripts were analysed using a 3-pass deductive and inductive coding approach. First, the researcher created a codebook based on existing educational resource search models: this included codes about strategies and habits in finding, evaluating, adapting, using, and sharing resources, as well as codes for used tools, material sources, challenges, curriculum-related aspects, and copyright and OER awareness. This codebook was used to annotate all the interview transcripts while re-listening to the recordings. Then, the researcher re-listened to all the recordings while carefully correcting all errors in the automatically generated transcript text and, at the same time, labelling interesting passages that were not coded in the first pass, extending the codebook with new codes. During this process, similar codes were refined and merged until the codebook was stable. Codebook changes were captured and are included in the dataset. Finally, in a third pass, the researcher re-listened to all recordings again and removed as much identifying detail as possible from the transcripts, while also labelling any missed passages with the final codebook.

Abductive analysis. The final coded transcripts and knowledge gained from this process formed the basis for reflective analysis. The researcher used the abductive analysis framework [26], focusing on surprising quotes and findings and experimenting with how they could fit in existing educational resource search models or potential new models (alternative casing). The results of this analysis are shared in the findings section.

Validation. The three data sources: pre-study questionnaires, interview discussions, and observations from search activities while screensharing, complement each other and help to triangulate the findings across perspectives. Interview discussions provide a perspective of participants' perceptions, while observations offer fine-grained insights into strategies used and challenges encountered by participants in a real-world task setting. Participants also had the opportunity to review their data and request corrections. The collected data were analysed by a single researcher, and hence no between-researcher triangulation was carried out. To mitigate this, outside of the study setting, the researcher had informal conversations with approximately 20 experts and teachers during January 2022 – June 2023 to discuss the study plan and work-in-progress findings. Other researchers are encouraged to verify the analysis from their own perspective using the open dataset.

3.4 Limitations

Participation in this study was voluntary and not remunerated. As discussed in subsubsection 2.4.3, most teachers in Scotland are already usually working way above their contracted work hours, and thus many might not have the time or will to participate in such research. The study findings may be biased towards the experiences of teachers who either have more free time, or those who have a personal interest in search or technology, or who could either relate to carrying out social science research or were altruistic enough to contribute to helping other teachers in the future.

Although the study sample size of 15 participants is a usual number in qualitative research, most of the interviews raised some unique points, and hence the findings may not be fully saturated. This is due to differences in participant roles, subject areas, and taught age groups, which mean some of the sub-groups only have 1-2 participants. A validation study with under-represented teacher groups and larger sample size would be useful to verify the findings, but it is difficult to balance this with the need to avoid burdening teachers who are already hard-pressed for time.

Some of the participants joined the meetings from school, some from home. One participant could not screenshare how they would search for online educational resources in real-time, because they did not have access to their work computer and software at the time, while for one other participant, it just wasn't relevant to their class and topic. Out of the 15 interviews, 13 included screenshare recordings.

Most interviews were carried out before ChatGPT was released at the end of November 2022 and generative AI was not mentioned by any of the participants. Considering the potential impact generative AI may have on lesson planning and resource creation, it would be sensible to investigate whether (and if so, how) new AI tools, like ChatGPT, Perplexity, SearchGPT, MagicSchool, TeachMate.ai, are impacting search for educational resources.

4 Findings

A simplified linear summary of the main aspects of finding, using, and sharing educational resources as they came up in the interviews is presented in Figure 4. It includes 10 tasks: lesson planning (which includes preparation such as choosing topics and assessments, deciding which order to teach things in, writing lesson plans), searching for self (which involves exploratory search for ideas or just to see what is available, but not for something to use with pupils), collaborating (engaging with other teachers on social media, communicating with external organisations), searching for class (looking for resources to use in class, usually with a concrete goal in mind), evaluating (considering whether and in what ways a resource is useful), adapting or creating (turning found resources into useable ones or making something from scratch), using (taking resources into the class in some form), storing (saving resources

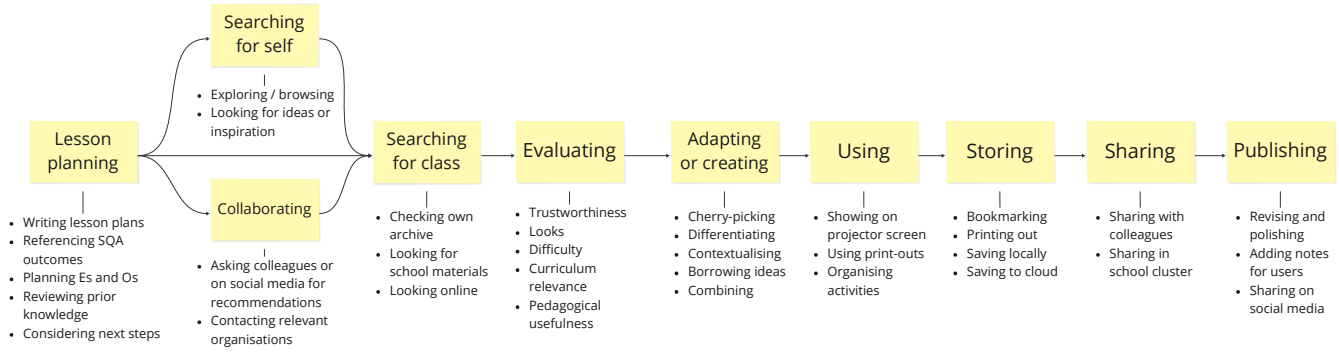

Figure 4: Linearised teacher online educational resource search process model

for own reuse later), sharing (exchanging resources in a closed setting, usually within the school), and publishing (making resources available publicly or in larger communities).

This model is most similar to the Task-Based Information Interaction model [14], although it also includes a distinction between "searching for self" and "searching for class" like in the findings of Bortoluzzi and Marenzi [2], more fine-grained "evaluation" strategies like those found by Burron and Pegg [4], and elements of "collaborating" [2, 6]. Tasks beyond "using" (so "storing", "sharing", and "publishing") are not strictly part of an individual's search process, but they are highly relevant information interaction tasks in the resource reuse ecosystem. Teachers can only find resources that others have shared, so the way people share resources impacts how others find them. For each of the tasks, participants had many strategies. Some examples are included in Figure 4, others are expanded upon later in this section.

The linearised model oversimplifies reality by not capturing the way teachers go back and forth between tasks, skip steps, or do them in a different order. The flow diagram in Figure 5 shows the same tasks with transitions. The width of each connection represents the number of times the transition was found in interviews and the colours match the outgoing task nodes. Transitions that only occurred once are omitted to aid readability. The data used to create this figure are available in Appendix B and the diagram itself was plotted using SankeyMATIC.

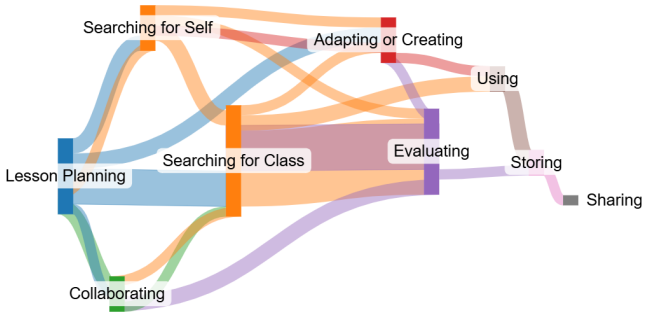

Figure 5: Educational resource search task transitions

Notably, teachers often go back and forth between lesson planning, searching, collaborating, and adapting or creating. Lesson planning is not necessarily always the first step. Participants discussed that they sometimes also begin by searching for self or collaborating. Teacher search starting points often depended on their school (whether detailed lesson plans are required, whether there is a shared space for resources between colleagues). Unsurprisingly, evaluating is mostly connected to searching for class (as this is when teachers were most critical about encountered resources). Only a small subset of viewed resources were selected for later use. Occasionally, teachers chose to store resources after using them and determining their usefulness in practice. Some teachers shared resources internally. Publishing does not even appear in the diagram, because it was very rare, and only one transition led to it.

4.1 Lesson planning

Teacher search for resources usually begins with conceptual lesson planning (cf. task planning in the TBII [14] model). However, participants at different levels and in different roles had different ways of planning. All reported quotes are denaturalised, removing stutters, pauses, and repeated words. Participant identifiers include whether the participant was teaching Broad General Education (BGE) or Senior Phase (SP) and their role between classroom teacher (class), supply teacher (supply), additional support for learning teacher (support), or other.

Senior Phase teachers tend to base their plans on the standardised Scottish Qualifications Authority (SQA) exam structure: "I'll go to the SQA outcomes and they have a page-long document that will tell you exactly what subtopics will be in the exam [...] that would always be my starting point" (Participant #20; SP, class) and "I'll start off with the course spec from SQA" (Participant #13; SP, class).

In contrast, Broad General Education teachers have a variety of different approaches. Some schools require formal plans to be prepared in advance, which determines classroom teachers' starting point: "part of our planning folder at school is that we have to produce the context overview with all the Experiences and Outcomes that we're planning to cover [...] We plan it within the first couple of weeks of term and then it will run for the rest of the term" (Participant #15; BGE, class). The written plans could become templates for new ones: "those topic plans get saved on the server, so you would maybe go to last year's to see if they've taught it before and get ideas from there" (Participant #3; BGE, class) or they could potentially be reused year-to-year: "there is a course outline

from my department about where we should be" (Participant #6; BGE, class).

In other schools, planning can be less formal, e.g., Participant #14 (BGE, class) shared, "to start? I would come up with a plan in my head" but that does not make it any less important. Lesson planning usually precedes search in general and always comes before searching for class: "I will look online once I have my idea, but I tend not to go online unless somebody's come up with something" (Participant #14; BGE, class) or "normally, if I'm searching for resources, I have an idea of the purpose of it" (Participant #11; BGE, support).

Some participants structured their plans to match Es and Os: "the first thing that I will do is make a mind map of what different Es and Os – Experiences and Outcomes – we could cover within that topic" (Participant #15; BGE, class) and "you're looking to meet the Curriculum for Excellence for that experience" (Participant #21; BGE, class). Because the Curriculum for Excellence only prescribes Es and Os at each level (such as BGE First which spans P1-4 and BGE Second which spans P5-7) rather than a specific school year, the order in which they are taught can vary and teachers have to refer to their learners' prior knowledge: "I would be looking to see the children's previous knowledge, so know what experience they've had already" (Participant #21; BGE, class). This is also important in Senior Phase, but it is easier assume prior knowledge based on the level pupils are currently at, because the Senior Phase levels (National 5, Higher, Advanced Higher) are more self-contained and only span 1–2 school years.

In most primary schools, teachers change classes at least every year or two, which requires class teachers to catch up with their new classes. Sometimes teachers have the opportunity to discuss with previous class teachers. Some schools have approaches to facilitate handovers, for example, "the way we have our tracking set up, it's very easy to go back and see the topics that they've done" (Participant #14; BGE, class). In cases where this is not available, or when teachers need additional insights, they sometimes review children's prior work: "look at, for example, any completed work and check that for accuracy. So that if there's been misunderstanding previously, you can pick that up and revisit it to make sure that they are secure" (Participant #21; BGE, class). Reviewing topics and knowledge is important not just to avoid repetition of previously covered Es and Os, but also to avoid repetition of topics – most Es and Os are vague so they can be taught in different contexts: "I look at what they've covered previously, [primary] 5-6-7 is second level. So, theoretically, for the primary 5s everything is new because it's a new set of outcomes. However, if they did space in primary 3, there's not a lot of value for them to do space in primary 5" (Participant #14; BGE, class).

When it comes to choosing the order of which Es and Os to teach, BGE teachers have a lot of flexibility. Participant #15 (BGE, class) shared that "there are skills that make sense or experiences and outcomes that fit naturally. I would definitely plan to cover them, but [...] it needs to be relevant and needs to tie well together" and gave an example with the "Life Below Water" topic they were planning to teach next term, "maybe the expressive arts? There's maybe not very much that is a natural link, although if I looked at the skills, maybe there are some skills about water colour, which is a tenuous link [...] Whereas, there would be, quite clearly, skills within social studies, skills within science, some skills within technologies, maybe some of the engineering ones that would fit naturally". In a similar way, primary teachers often choose interdisciplinary topics that allow them to bring in skills or Es and Os from a range of areas.

Not all BGE teachers explicitly mentioned Es and Os in their lesson planning. Another structured planning approach mentioned by Participant #19 (BGE, class) was based on what the learners would like to learn: "often with topics, we start with [...] 'KWHL': "What do you Know? What do you Want to know? How do you want to learn it?". And then at the end you go back with them and say, "OK, what have you Learned?"". Most primary school teachers emphasised adapting plans to their learners' needs and interests in a similar way, highlighting how primary education in the Scottish Curriculum for Excellence is learner-driven: "before the end of the year, when I have transition days where the class move up and I get my new class, and one of the things I do is, we have a big sit down and talk about all the things they would like to do. So they come up with lots of things that they might like to learn and I try and incorporate as much of that as possible. But obviously I also have to include new learning. So sometimes they're doing something they wouldn't have come up with by themselves" (Participant #14; BGE, class) and "I will also go to the learners and ask them, "what do we know about and what are life below water? What do we want to find out?" And then we'll use their questions to try and plan out the weeks' worth of the topic" (Participant #15; BGE, class).

Some participants mentioned that they plan together with colleagues. In larger schools, there may be multiple parallel classes for the same stage or year group – their teachers are called "stage partners": "I'm really lucky because I have a stage partner. So there's two classes in each year group. So everything starts with having a chat with your stage partner" (Participant #19; BGE, class). In other schools, even if there are no parallel classes, teachers within a department may collaborate with each other on lesson planning. This is most applicable to secondary schools that have separate subject area departments: "we have regular weekly department meetings just to compare with the classes, because we also do French, Spanish and Italian. So, "where are you with your first years?" or "what have you just done and what are you moving on to next?" So it's good for us to see if we're at the same pace as one another or who needs to, maybe, catch up" (Participant #6; BGE, class) but is also relevant in primary schools, especially for teachers in more senior roles who are responsible for more than just their own teaching: "the other thing I look at is to make sure that there's arrangement across the organisers" (Participant #14; BGE, class).

Teacher planning can also be influenced by current school and wider region strategies: "as a school, we're moving towards doing less stories and more factual writing 'cause it seems to scaffold better for the little younger kids and the ones who can't work it out. [...] So we're looking at report writing" (Participant #8; BGE, class). Focus areas are largely informed by the annual National Improvement Plan.

Participants also talked about incorporating local or current context, which is part of the core values of the Scottish Curriculum for Excellence: "in the summer last year, we were doing distilling [...] because we've got all the distilleries [in the region]" (Participant #14; BGE, class) and "we were just looking at the calendar and saying "OK, what's coming up [...] let's do something contemporary so it

feels super relevant to them what's going on. And they feel engaged with it"" (Participant #19; BGE, class). This aspect, in particular, poses a challenge to reuse of online educational resources, because there rarely are materials about very recent or ongoing events: "we're constantly trying to make things relevant [...] If something's happened in the local context and the community, you're always trying to tie it in with things like that. So prepackaged content is not necessarily... What you need" (Participant #15; BGE, class).

Participating supply teachers explained that due to the variable nature of their work, planning in advance was not always possible:

> Participant #9 (BGE, supply): They send out emails [...] when schools need supply work. And it says the name of the school and how long they need a teacher for. Sometimes it says the age group, but most of the time it doesn't. And that's just e-mailed to everybody, all the supply teachers, and you can respond and say you're available, and then you just have to go to the school and it might be for one day, or it might be for two days, or a week, or two weeks.

Additional support for learning teachers felt similarly, because they had to adapt to class teacher plans and pupils' needs in the moment: "it's got to be responsive cause they've got different gaps, you see" (Participant #11; BGE, support) and "for writing activities, perhaps because that tends to be what the class teacher plans, I don't always know exactly what is expected. I generally know on the day, but not always. So I guess thinking ahead, I don't have that planned" (Participant #17; BGE, support).

Lesson planning is the preliminary step that usually precedes search. Teachers' conceptual goals guide the rest of the process from here onwards. Common teacher strategies for this step include: writing lesson plans, referencing SQA outcomes (in Senior Phase) or Es and Os (in Broad General Education), reviewing prior knowledge, and considering next steps. Participants' experiences show both unique individual elements and systematic differences based on role, school, level, and local context, which are key aspects of the education system that influence the educational resource search process.

4.2 Searching for self

Although previous research (discussed in subsubsection 2.4.3) shows that teachers spend a significant amount of time on planning lessons and preparing resources, the study participants made it clear that this does not necessarily entail looking for educational resources online. Common alternatives are turning to physical resources or colleagues or getting the pupils to do it themselves: "if I know there is resources in school, I would go to that first" (Participant #17; BGE, support) and "I would look in the school for in-class resources, like books and things to decorate the class with" (Participant #9; BGE, supply) or "I'm not necessarily searching for resources [...] I also have a lot of resources where the children have generated them for themselves. So there's content that they've sourced and they've dumped into the shared file for the whole team" (Participant #11; BGE, support). On the other hand, this depends on school culture: "I'll often pass by a classroom and go "oh, that's amazing!" And they'll go "ohh, I'll send it you" and you're like, "ohh, that's brilliant". But I have worked in schools where they won't tell you where they found the YouTube video" (Participant #3; BGE, class).

Most schools keep some internal digital resources: "in a previous school I worked at [...] it was all on the school intranet and you can just find it in there. And then the previous school, it was a school Google Drive", shared Participant #9 (BGE, supply) but then they also continued to note that supply teachers often have difficulties accessing internal resources, which makes them more likely to look elsewhere, "as a supply teacher, it's completely different because I don't have access". This experience was echoed by Participant #5 (BGE, supply): "I'm not actually, as a supply teacher, allowed access as a teacher to their programs".

In cases where search preceded lesson planning or was intertwined with it, participants mentioned searching for ideas or materials for themselves to become familiar with a topic: "I'd have to research a bit more about what I'm aiming to teach" (Participant #17; BGE, support). This is in contrast with searching for material for pupils, "the purpose of the activity has to be clear in my mind before I can search for a resource to back up what I'm doing" (Participant #17; BGE, support).

Participant #9 (BGE, supply) shared that they might start by looking for lesson plans on the internet, but only as a fallback option because there were no available colleagues to collaborate with: "there weren't many other staff members to ask, so I did rely on the internet a lot more, especially for planning, like, I would download term plans for the topic [...] I was definitely using the internet a lot more because the school had less people and physical resources for me to use".

Those participants who did look for resources on the internet often mentioned Google and Twinkl as their starting points: "not a lot in the world starts without a Google search" (Participant #19; BGE, class) and "generally it is actually Google. It's either Google or Twinkl" (Participant #17; BGE, support). Google was used by virtually all participants (some participants called it "Google" even when using a different search engine, e.g., Bing, during the screen-sharing exercise) but none mentioned specific strategies they would use to look for materials for themselves: "when you do you topic plans, you are just.. you just Google keywords hoping something more will come up" (Participant #3; BGE, class). Twinkl came up in most conversations with primary teachers (mentioned 36 times) but only once with a secondary school teacher. This is unsurprising, given that Twinkl is mainly a primary school resource bank. Participants looking for materials for themselves used it for inspiration: "Twinkl's a bit like the Wikipedia for teaching. I think it's a brilliant place to start to get a general idea of the sorts of things that you might want to look into" (Participant #19; BGE, class).

The findings from Bortoluzzi and Marenzi [2] included distinct steps of searching for professional learning and searching for personal development. In this model, both are grouped together into the "searching for self" task, as there isn't a very clear distinction between them. Participant #15 (BGE, class) mentioned professional learning: "I am also part of this year's STEM Development Group. We're putting together an online platform for CPD for teachers within STEM. So although it's not necessarily directly resources for teaching in the classroom, it's more resources to upskill teachers to be able to teach STEM subjects" but it did not come up other conversations.

Searching for self is not always included in the educational resource search process. When it is, in this step teachers go exploring and browsing to look for ideas or inspiration before or during lesson planning. This was most relevant for less experienced teachers, those who were teaching topics they were not as familiar with, and those who wanted to find new ways of doing things.

4.3 Collaborating

Like the previous research on search in education indicates, teachers do not search alone in a vacuum – collaboration and digital-word-of-mouth recommendation is a major aspect of educational resource search [2, 6]. The participants in this study discussed how they often turn to colleagues and external organisations to find resources:

> Participant #14 (BGE, class): So you can go to SSERC [Scottish Schools Education Research Centre] and say, "I need this" when "I want to do this" and they're really helpful. But I find that with most organisations, I feel we spend a lot of time here emailing people saying, "want to do this. Can you tell me how?" And then organisations are usually really good. So like the Royal Society of Chemistry helped recently with a distilling project and gave me lots of resources and stuff.

> Participant #15 (BGE, class): if somebody says, "I'm doing this context. Does anybody got anything for that?" We probably just fire an e-mail across to each other with resources. [...] This year in our cluster we have done visiting each other's schools, [...] It's been a learning environment, walk rounds, so the staff [...] came round and looked at things in my classroom and all my walls and asked questions about that, and I was able to direct them to different resources or different platforms that I've used.

For many teachers across different education stages, social media networks were also a helpful source of information: "I might turn to social media, Twitter, particularly for book recommendations" (Participant #15; BGE, class) and "I'm also a member of the Scottish History Teaching Facebook group and they have a shared drive that other people can access. [...] if someone's teaching an Advanced Higher topic for the first time and they might not have resources. And there it's very much a sharing environment in there, where people will ping the resources over to each other" (Participant #20; SP, class). Social media could be useful not just for resources and ideas for pupils, but for teacher strategies too: "I'm a member of the Scottish Primary Teachers Facebook forum and there's always lots of chat on there about [...] how teachers find their resources" (Participant #17; BGE, support).

The collaborating step has conceptual overlap with lesson planning, searching for self, and searching for class, since all of these activities can be done together with colleagues. Its distinction helps to highlight strategies like contacting external organisations and asking for help on social media which goes beyond the immediate colleague circle that is typical for other steps of the process. Unlike regular search where teachers must initiate the first step, collaborating encompasses interactions where teachers may also receive unprompted information (e.g., via email newsletters and social media update feeds).

4.4 Searching for class

If a teacher decides to look for resources online to use in class, there is a wide range of sources to turn to. The 15 interview participants and 4 participants who signed up and submitted pre-study forms but could not attend altogether identified 161 different tools, websites, and communities that they use (both generic, such as their own materials archive or a class novel and specific, for example, Google, Twinkl, and SQA Past Papers). The full list of material sources is available in the accompanying open dataset. The top 5 sources identified by unique participants (in transcripts, screenshare recordings, or pre-study forms) were:

(1) Google – identified by 15 participants
(2) Twinkl – identified by 12 participants
(3) School server – identified by 10 participants
(4) Own archive – identified by 10 participants
(5) Tes Resources – identified by 9 participants

Notably, both internal school servers and teachers' own archives are in the top 5 places to look for resources. Use of school materials was already covered in the "searching for self" step, but in addition to finding general materials for lesson plans and ideas, teachers often also share and seek out pupil materials on internal shared drives. As for own archives, most participants said they first look at materials they had created or found and saved previously, which bypasses the need for searching online: "for materials, honestly, I would look at what I've already created in the past" (Participant #3; BGE, class) and "I do rely a lot on my own bank of materials [...] Well, as you can imagine after all these years, I have everything on disks" (Participant #5; BGE, supply). Participant #5 pointed out that one of the main advantages of reusing previous materials is "because I know that they have worked", unlike the uncertainty that comes with using something new from the internet. However, this is not always applicable, for example, Participant #3 (BGE, class) mentioned that with the class they were teaching at the moment, their previous resources were "not really suitable because they're [this year's class] not as advanced as those other children".

When looking for resources online, teachers employ many search strategies. At this point, they usually have a clear idea of what they're looking for and some already know exactly where to go from previous experience:

> Participant #3 (BGE, class): This type of learning that we're talking about is from someone called Anne Glennie and she's written about reflective reading and she has a website where people upload resources that people have created that you can download and use yourself.

> Participant #4 (SP, other): Wolverhampton Chemistry Department do a fantastic series on.. [...] all the elements. And they describe each and every single element and it's fantastic, but it's not necessarily useful for every single one of my students.

Similarly to how Burron and Pegg [4] found that teachers used keywords from the curriculum, Senior Phase teachers used specific terms from the SQA outcomes for their topics, for example, "[browsing SCHOLAR, clicks on the "Higher Physics" course link], we can then pick up the various different sections. And so if we go into "particles and waves". "forces and charged particles". We can then go down to "wave-particle duality". There we go" (Participant #13; SP, class).

In other cases, teachers turned to search either in resource banks:"websites like Twinkl or Teacher's Pet or TeachersPayTeachers. Just whatever if we Google. But I tend to always go to Twinkl [...]. It is a go-to resource site definitely" (Participant #17; BGE, support)) or via search engines ("it's fairly easy enough to Google search in German, "classroom language phrases" or something like this" (Participant #6; BGE, class).

When looking for resources using a general site like Google or YouTube, teachers usually narrowed down the results by topic and age group, which is apparent in the queries that teachers used:

- "roman artwork for kids" on Pinterest [Participant #9 (BGE, supply)]
- "problem solving percentage questions age 8-9" in Google [Participant #11 (BGE, support)]
- "classification videos for schools" in Google [Participant #14 (BGE, class)]

Some teachers looked specifically for curriculum aligned resources, for example, Participant #15 (BGE, class) queried "life below water curriculum for excellence" in Google. But several participants recognised that this could limit the results: "I'd probably start with Twinkl because that goes from the Scottish curriculum, but there's a lot less resources online for the Scottish curriculum" (Participant #9; BGE, supply). A common strategy to expand the search scope was to refer to the English National Curriculum instead, which has some overlap with the Curriculum for Excellence and a far larger learner base (and hence, available resources online), for example, after querying "food chains KS1", Participant #21 (BGE, class) clarified: "sometimes I type in 'KS1' because that's the English version of it", meaning approximately BGE First level, which would be appropriate for children in P2. Participant #11 (BGE, support) also used the same strategy: "I put in "percentage problem solving activity KS2", so that's Key Stage Two because it, that's really whereabouts I am". It shows how experienced teachers are aware not just of the curriculum they teach but also other relevant curricula and can leverage this to find more resources.

Teachers only have a limited amount of time for trawling through resources. Participant #3 (BGE, class) related this idea to a typical school day: "I'm teaching maybe six different subjects. You've not got time to spend ages". Participant #17 (BGE, support) highlighted that the amount of time they have available influences how they approach search: "things like Maths Salamanders, Snappy Maths.. there are a lot. [...] if you hit, you hit it, but if you don't, you might be wasting time. So if you've only got a short period of time to look, then you'd probably go for Twinkl or Mrs Mactivity or TeachersPayTeachers".

Participant #7 (SP, other) explained how, in a domain-specific source, like a YouTube channel, they look for broad search terms: "I would have a look and see what they've [Ricochet Science] got [on enzymes]", but when looking in all of YouTube, they narrow it down to a more specific topic: "now for something as big as enzymes that wouldn't be that great cause you would get a myriad of things, [...] but what I might do is [...] [finishes search query with "enzymes lock and key"] a subtopic within the enzymes".

During the screensharing exercise, when using a search engine, many participants started with initial queries and adjusted terms on seeing the results and search suggestions, which corresponds to berrypicking and browsing [1]:

> Participant #17 (BGE, support): The first thing I put in was what the teacher and I were talking about, "amounts of money in decimal notation", but that wasn't coming up with pupil sites. It was coming up with things that were a lot more complicated and wasn't school sites in particular. [...] I put in "how much money", "how much", "how much is this?" And then I think Google suggested this – "how much money in the jar"

Several participants also used the "Related Searches" feature at the bottom of Google search results, which facilitates similar interactions.

Google search dynamically adapts to links that users click and suggests more similar results in the future [10]. Participant #4 (SP, other) mentioned they clear their cookies specifically to avoid this feature, "'cause what I was finding is that in the past I would search something up on Google and because I had my cookies on, it would always be directing me to particular types of pages all the time. And I've already investigated them and they're not good for me. [...] So therefore, I turn all my cookies off, and that way every time on Google it's something new".

Despite the variety of creative strategies for search with search engines, it was often a last resort option for teachers. "It's just really hit-and-miss the type of materials that come up" lamented Participant #6 (BGE, class).

Searching for class is the core step of educational resource search. Teachers use strategies like checking own archives, looking for school materials, or looking online in a variety of places. When using search engines, teachers had tactics like specifying curriculum, curriculum keywords, topics, age group, level, and navigating via search suggestions.

4.5 Evaluating

When searching using a general search engine, teachers need to evaluate lots of results very quickly. To achieve this, they use heuristics to decide which Search Results Page (SERP) results are worth clicking on, which aligns with the Complex Searcher model [16]. Some commonly used heuristics by participants in this study were source authority, looks, and curriculum alignment.

Participant #14 (BGE, class) explained how they memorise useful websites and look out for them among search results, "[I] go to reliable websites first. I mean places that I've gone to before. [...] I'm not going to go to any website that comes up. I'm gonna go to one that I immediately recognise as being either somewhere I've gone before or somewhere that I know it's gonna be reliable". Thus, the authority of the source (author or website) acts as a quick proxy for resource quality.

In another scenario, during the screensharing exercise, Participant #6 (BGE, class) shared how they glance over resources and pick out ones that look attractive to see in greater detail: "what I generally go for is images. [Switches to image search] I'm quite a visual person myself, so if I see something that I think, "oh, that catches my eye," I think it's probably gonna catch their eye as well". Scanning through YouTube video results about capital letters and full stops, Participant #5 (BGE, supply) picked one and clarified, "what attracted me to this one was the words and the colours. I like colours. Children learn well with colours." They also highlighted that there is a balance to be struck between picking something that looks fun and engaging but not too childish: "I also felt that that wasn't patronising for P7. Unlike the pirate video". Lack of visual previews impeded search for Participant #14 (BGE, class): "I find things a little harder to find on STEM Central because it doesn't have little pictures of what's involved [...] you have to download the PDF file first, so that can be quite frustrating [...] descriptions maybe aren't comprehensive enough, but really what I just wanna see is a shot of the file".

Another heuristic for evaluating the amount of work that would be required to adapt a resource for use in class was looking at where resources are from, which helps to quickly judge curriculum relevance. For example, Participant #9 (BGE, supply), while looking at a SERP expressed disappointment: "so that's the annoying thing. A lot of these websites are English and you have to.. adapt it yourself". When resources are made for a different curriculum, they can still be useful but may require additional adaptation work before they can be used, which may not be worth the hassle if something more relevant is available.

Because "lesson planning" precedes "search for class", at the point of "evaluating" resources, teachers already have ideas how resources should align with their teaching goals. For example, Participant #15 (BGE, class), considers results in comparison to planned Experiences and Outcomes: "because the Es and Os are fresh in your mind, you can see "oh that's a good idea for that experience and outcome" [...] that helps you to decide what would be relevant or not". This is sometimes clear from result titles and previews, although other times, teachers have to consider the resources in depth to judge alignment with the curriculum and lesson plans.

After coming across a promising result, most participants either opened link to it in a new tab or downloaded the resource and only looked through links or files after gathering several, rather than inspecting resources one by one. When reviewing gathered resources, participants did not necessarily consider all of them, for example, Participant #14 (BGE, class) explained, "I would say if I'm ever managing to use 50% of the stuff I actually download when I'm doing my research at the beginning of a topic, that I'll be doing well".

When inspecting a resource, participants usually started with a quick skim through it, considering whether parts of it could be useful, rather than treating the whole resource as a single unit. For example, Participant #9 (BGE, supply) mentioned how they usually approach online lesson plans: "I'll usually give it a quick scan through to see if there's any additional information that might be useful but I usually.. I won't follow it religiously". For those teachers who looked for parts of resources, modifiability was an important aspect: "I mean obviously, when we're searching for resources, we're searching for ones that we can use and can modify" (Participant #15; BGE, class).

For evaluating resources in detail, participants still used the same evaluation criteria as for heuristics (credibility, looks, and curriculum alignment) but also paid careful attention to appropriateness for their learners in terms of difficulty and topics covered: "[I] check the level because, as you can imagine, you could describe enzymes at a really simple level or a really complicated level. So I have to always watch the material and check that it is right because you don't want to be confusing them with stuff that they don't need or equally not giving them enough" (Participant #7; SP, other).

Several participants highlighted differences between subjects, that it was easier to reuse resources in some more than others, for example, "I have some subjects like maths which are really straightforward. But then I have more philosophical topics I teach, [...] I'm teaching an inequalities topic [...] And that's a little bit more interesting because it's a more controversial topic. Or it's much more opinionated than "five add three"" (Participant #11; BGE, support). Participant #11 also shared how they take different approaches to evaluating resources for different subjects emphasising that there is no one-size-fits-all pattern for how teachers evaluate resources: "there's a different way of sifting the resources. Because you've got to go through opinion pieces, you've got to look at the lens with which that article was written. There's a lot more critical thinking in a different way than the critical thinking that you'd have to put into the resource [...] it really depends on what they're gonna use that resource for, what's their intended purpose, how it fits in with their overall plan. And how they think the young people are gonna engage with that particular resource".

Participant #11 (BGE, support) spoke about the need to check that resources align with their school values: "we have another angle because we're a faith school. So because I teach in a Catholic school, I can't just go grabbing anything off the internet and teaching it, and putting it straight without vetting it first. They have very, very clear rules for me engaging. [...] I'm not a Catholic but I teach in a Catholic school, so there's a level of respect that I have to bring to what resources I use in the school".

Evaluation of online educational resources for teachers is a multi-stage step. It starts with quickly filtering out least promising search results following heuristics, then considering each of the selected resources through skim reading, and finally more in-depth consideration of the most relevant parts of resources. Participants looked out for trustworthiness and credibility of sources, the looks of resources, curriculum relevance, difficulty, and pedagogical usefulness.

4.6 Adapting or creating

Concurring with previous research [2], almost all participants emphasised that they would not reuse existing resources as-is. They either adapt what they find or make something new from scratch, borrowing just ideas as inspiration.

It seemed like for some participants, adapting resources was part of their professional pride in their work, wanting to adapt things to their own teaching style and to their pupils, as Participant #4 (SP, other) shared: "so you might teach my subject and have written ten years' worth of materials. But that's your materials, not my materials. And so you might be kind enough to say, "you can

use my materials there." So I'll go, "okay, cheers [Interviewer], no problems." But the moment I start using them, I go, "no no no, I could.. not quite happy with that." So I'll tweak it. Or I'll add things to it".

Adapting or creating resources could be dependent on the school practices, for example, Participant #6 (BGE, class) explained, "we have a department standard for the first couple of slides of our lessons. So, the first one would always be a starter activity [...] my second slide, would then cover our learning intentions and success criteria for the day". Several other participants also mentioned using explicit learning intentions and success criteria. Thus, one possible adaptation is to "wrap" resources with lesson aims.

Cherry-picking parts of resources was another very common adapting strategy: "I would go and I would pick a bit of it. I wouldn't use the whole thing from start to finish" (Participant #15; BGE, class). Sometimes cherry-picking involves modifying the materials and deleting less useful parts: "half the worksheets, you're thinking, "I don't need that", but they've got an editable version, so you save that, edit it to your needs and use that" (Participant #8; BGE, class). Sometimes, just choosing what to show learners and the order to show it in without modifying the resource was a valid approach too: "Yeah. Or you bring them up big enough so that nothing else is shown on the screen anyway [..] and then in some order" (Participant #11; BGE, support).

Yet another common adaptation approach was differentiating resources, so that learners of different abilities in the class could all learn from them: "it's about taking away the things that are going to cause them stress, but allow them still to be doing the same activity as everybody else. I think there's often a feeling that differentiation is about making things easier for some people, and it's not. Differentiation is about making things accessible for all people" (Participant #14; BGE, class).

Participant #14 (BGE, class) went on to explain how strategies for differentiation differ by subject: "when you come in to do science, everybody can sit and see a science experiment and get involved in it, and get you to talk about it. It's just the level of understanding about what's going on behind what they're seeing will be different for different children" whereas "if it was reading comprehension, you know there are levels of difficulty of a passage I just can't give to some children in my class. So then the differentiation would involve using text to speech software so they can have it read aloud to them to enable them to access it". However, Participant #14 also clarified that sometimes adapting a resource (or how the resource is used) is not the right approach, and instead, several resources may be needed: "there will be some pieces of reading that it's still too hard for them. So again, it's then finding differentiated pieces of reading. So you couldn't give the same piece of reading to every child in the class in the same way that you can have a science experiment being done by all the children in the class".

When participants chose to reuse resources found online, they all followed this up with a step of adaptation, although this did not necessarily always require modifying the resource itself. Common strategies were borrowing ideas for inspiration, cherry-picking parts, adding more context, combining resources, and differentiating them for learners' needs.

4.7 Using

Using resources in class is a mostly self-explanatory step, however it is worth highlighting that there are multiple ways to use a resource in class and that the applicable approaches depend on the type of resource.

For digital media, sharing on a projector screen was a common approach, but teachers also used print outs or sometimes just borrowed ideas and inspiration from found materials for verbal teaching or practical class activities: "sometimes it's just a straight copy, I'll just put it up onto the whiteboard" (Participant #11; BGE, support) or "online resources. So we're looking at more things that you can print. So that physical resource, but you also look for ideas for things" (Participant #21; BGE, class).

4.8 Storing

Looking in one's own archive was a common strategy to find resources. To be able to do so, teachers initially have to find or create resources and store them for reuse later.

Some participants said they usually bookmark links: "if I get the same question time and time again, that's when I'll go, "OK, I probably need this for future reference," so I bookmark it" (Participant #4; SP, other) or email resources to themselves: "usually I e-mail things to myself so I will check my e-mail to see if I've sent myself something before" (Participant #3; BGE, class). Some download and organise resources in a document: "now that we're fully on Google Drive, whenever I make plans, I link all the resources that I've used and websites that I've used. I just drop them onto the onto the Google Docs and create a rich document that way so that everything is there" (Participant #19; BGE, class). Some use cloud storage and search: "you can search within OneDrive. You can search within OneNote for key phrases. So I'm very careful to label things, name things and relate, usually related to the skill that I'm teaching them because then, when I'm searching my OneDrive or I'm searching my OneNote, it will find that" (Participant #15; BGE, class). Others use USB drives: "I tended to have a pen drive that was just for resources so that I could take them between home and school" (Participant #21; BGE, class) where they could be organised in different ways, for example, by class: "[I] tended to have wee files for different classes" (Participant #21; BGE, class) and/or by topic: "it will be broken down by which year group, which topic" (Participant #6; BGE, class).

Another strategy mentioned by Participant #5 (BGE, supply) was to only save resources that were useful in practice and add notes: "I tend also to put whether it was good, you know, what went well. If it didn't go well, I don't save it". This makes the personal archive of resources more useful than any online repository, as the same participant later confirmed, "I do rely a lot on my own bank of materials because I know that they have worked".

Storing resources is a distinct step in the educational resource search process that shows how the steps of evaluating and adapting may sometimes be skipped when reusing own resources, which was not the case for resources found online. Participants had a variety of strategies for storing resources, including bookmarking, collating in a document, saving to the cloud or locally, or printing out and keeping paper archives.

4.9 Sharing

The step of sharing is closely connected to collaborating, but it is from the perspective of the person sharing resources rather than one looking for them.

Sharing resources with school colleagues in closed settings was common practice: "I don't tweet or have any of that type of stuff. I just share resources internally" (Participant #11; BGE, support). Most often, participants mentioned sharing resources directly with specific people by email: "I might e-mail it to them" (Participant #9; BGE, supply).

In secondary schools, teachers often also share resources within their subject departments, e.g, "we have a shared Google Drive, so within the department for teachers, any teaching resources that we create, we put in our folders in there and then if it's a useful article, I would probably share it directly with the colleague who teaches any similar classes" (Participant #20; SP, class). In primary schools, since most teachers are generalists and there are no subject departments, the resources would typically be shared with everyone. They could be organised into folders by staff: "if we have a shared drive [...] most of the time things would be put in that folder and I.. we just tell each other [...] "you can find it in my folder under there"" (Participant #9; BGE, supply) or by subject areas and topics: "there's a literacy folder [...] anything that's useful, you shared there. Maths, share it. RE [Religious Education]. All the sacraments were there. [...] Click 'rainforests' and there's all these resources that everyone else has found to save you having to relook at them. That was the idea" (Participant #8; BGE, class).

Resources may be shared across primary and secondary schools in a school cluster, like described by Participant #11 (BGE, support): "the "feeder" primary, so the primary school that would normally come up to me, I would send info, that if we felt it was a really good resource, we would make sure they knew about it".

Sharing practices seemed to depend on the school culture and local authority: "[LA02] have no facility for sharing activities. [...] secondary schools don't want to talk to primary schools and there is a great reluctance of any sharing across schools. [...] You'll find when you go [direction] to [LA24]. And [LA32]. They are very good. As are [LA04]. [...] But most teachers in [LA02] just have to do it themselves" as well as "I've worked in three secondary schools in [LA02] and none of them have shared resources. Each teacher has his or her own resources" (Participant #5; BGE, supply).

Whilst teachers frequently shared useful resources with others, unlike suggested by the step of "Contributing" in the OER task taxonomy by Cortinovis et al. [6], participants said they do not normally share back their modifications with original authors unless asked: "no, I probably wouldn't, and same in the department actually, if I used someone else's work and adapted it and changed it, I would save that as a new document. But I wouldn't ever go to them and said, "I've enhanced your work". I think I'd be conscious of offending someone" (Participant #20; SP, class).

Sharing between teachers in closed settings, for example, in a school or school cluster, was common in the experience of the participants of this study. Teachers frequently look for resources shared by peers instead of searching on the public Web. There was no one way that teachers went about this, and approaches differed between schools and local authorities.

4.10 Publishing

Although sharing between colleagues is common, only a couple of participants mentioned that they have shared their resources in public spaces in the past: "I've put stuff up on TES quite a few times" (Participant #19; BGE, class) and "where I do share across schools is National 5 beekeeping. We've got a Facebook group and.. [clicks on the "Files" tab, it takes a while to load] [...] So we can share all files and now this is only between staff. [...] But you can see quite a few bits are mine" (Participant #13; SP, class).

There are very positive reasons for sharing resources and practice as much as possible, summarised by Participant #19 (BGE, class): "I do like to share with other people and I think that's a great way that teachers can help each other to tackle things like workload and stress and consistency across the curriculum, and challenging each other to be better, and to develop things, and I think sharing is absolutely fundamental".

However, there are even more reasons why teachers choose not to publish resources. One of these is that preparing resources for publishing takes a lot of extra time. When teachers already frequently work overtime, publishing "just takes too much time and effort. I've usually got other stuff to do. The only times I've done that is on this official school blog, things which are for parents and which I'm usually obligated to do [laughs]" (Participant #9; BGE, supply). On a related note, Participant #6 (BGE, class) mentioned, "I haven't really thought about putting it out there for anybody else. And then, I guess maybe selfishly, there's a part of you that thinks, "should I do it for free, should I maybe charge for this?""

Publishing resources takes more time than internal sharing because the context must be embedded in the materials. Participant #14 (BGE, class) explained, "it would take a lot of time to organise it and curate it in a way that would make sense to somebody else because you have.. I very much do it specifically for the way I teach and for my class." For Participant #11 (BGE, support), this was a reason not to publish at all: "I know teachers go on about reinventing the wheel, but I'm very responsive, so my stuff works for the pupils that I'm using it for and I don't really have a massive interest in putting it up online in any shape or form. I think it's.. they work very specifically because, I spend a lot of time making things bespoke".

Some participants had concerns over copyright of any materials they used or adapted to create their own. As Participant #3 (BGE, class) said, "we, as teachers, we are very guilty of just snip, you know, the snipping tool. [...] The legalities, you know, if I don't credit somebody and they turn around and say, "actually I made that from this group", I would get into trouble. I'd be worried about that." In Scotland, using copyrighted material is generally allowed for non-commercial private or classroom use under UK copyright law exceptions [27], but this would not extend to publishing the material.

Fear of criticism was another major factor for several participants. Participant #3 (BGE, class) related, "nobody's rubber stamped it and said to me, "that is the right thing", you know, "that is correct. The way you're teaching it is absolutely perfect for that level." So you've only got your own confidence, I suppose.. and experience. I work alongside other teachers, so I know it's right for me and my children, but nobody's actually said that. So I guess that's the other

thing that would put me off. Someone might turn around and say, "oh that's really hard". You know, "you're not really supporting." Or they might say, "well easy! First level?! You should, you should be further on than that." so, I guess that's what stops me as well." Teachers, understandably, would rather avoid exposing themselves to online hate.

Participant #5 (BGE, supply) highlighted how it does not make sense to publish resources in an environment where there is no culture of sharing and reusing resources: "I've got [around 50] years of resources I kept, I've transferred everything to pen drives, typed things up. Nobody's interested".

Yet another factor were issues around intellectual property ownership and local authority policy. One (anonymised) participant mentioned, "I think the Council has a bit of a funny viewpoint on it as well. They.. I think they seem to say, "you've created this on our time, on our dollar, so you shouldn't share things widely with others" a little bit, which is kind of strange viewpoint." This was not an isolated case either, as another participant recalled a relevant story: "Someone wrote a book [...] and they couldn't get it published because the council wanted, not my council, but the council wanted. They said they owned it. And they wanted the profit. So then the person who made it said, "[...] I'm not gonna make it because you get the money.""

The step of publishing is distinct from sharing because of the additional requirements and risks of making resources available on social media, resource banks, or personal sites. Due to various concerns, most teachers choose not to share publicly and stop at sharing with colleagues in closed spaces.

5 Discussion

The teacher educational resource search model presented in this paper covers the online educational resource reuse ecosystem from creating to sharing to finding resources. Returning to RQ1 (what are the educational resource search behaviours of teachers working in a flexible education system?), the main tasks involved are "lesson planning", "searching for self", "collaborating", "searching for class", "evaluating", "adapting or creating", "using", "storing", "sharing", and "publishing" resources. Teachers use a variety of approaches and strategies for each of these tasks, as described in section 4.

Existing models from the literature review cover part of the relevant tasks in educational resource search. The Information Search Process [15] explains how teachers transform a vague information need into a concrete goal, which is a good model for the "searching for self" task, but it does not directly lead to "searching for class" or "creating resources" without "lesson planning". The TBII model [14] covers tasks from "lesson planning" to "using", although it misses out on aspects of "collaborating" and differences between "searching for self" and "searching for class". The Complex Searcher Model [16] shows a detailed distinction between reviewing search result snippets vs full resources, which is covered in the "evaluating" task. The findings from Burron and Pegg [4] include education-specific search and evaluation strategies which are also relevant in the Scottish Curriculum for Excellence context and are reflected in the "searching for class" and "evaluating" tasks. The findings from Bortoluzzi and Marenzi [2] overlap with the steps of "collaborating", "searching for self", "searching for class", "evaluating", and "adapting or creating". And the OER task taxonomy [6] covers some of the strategies for "searching for class", it has a similar distinction of tasks between "collaborating" and "publishing", and matches "using" and "adapting" (="repurposing"). None of the previous models distinguish between sharing internally and publishing externally as different tasks nor note "storing" as a separate task which may take place after "using" a resource, creating a shortcut for future searches.

Reflecting on RQ2 (how does the education system influence teachers' information interactions in educational resource search?), many of the strategies used by teachers to carry out their tasks are linked to the curriculum. In "lesson planning", "searching for class", "evaluating", and "adapting or creating", Broad General Education teachers reference Experiences and Outcomes while Senior Phase teachers refer to Scottish Qualifications Authority unit descriptors and past exam questions. Participants showed how they can use resources designed for other curricula (and this is used to expand search scope when there are not enough specialised resources) but this requires additional checking and adaptation work, and so resources tailored to teachers' own curriculum are preferred. The flexibility of the Broad General Education curriculum phase in adapting to learner interests, local context, and timely relevance has educational merits but makes it much more difficult for teachers to reuse existing resources than the more standardised, lower flexibility, Senior Phase. Senior Phase teachers have access to more structured resource banks than Broad General Education teachers, for example, SCHOLAR, where topics are organised in the same way as SQA unit descriptors. SQA guidelines also specify concrete topics, which allows teachers to search for resources by keyword from the curriculum, whereas Broad General Education teachers' searches tend to be more exploratory. This demonstrates how curriculum flexibility is an impactful factor in teacher educational resource search. Beyond the curriculum, the availability of external educational organisations largely impacts the "collaborating" step, while institutional and national policies influence how resources are shared in "sharing" and "publishing" steps. The division of teacher roles and labour also plays a significant part, with "lesson planning", "collaborating", and "sharing" opportunities differing for classroom teachers, supply teachers, and additional support for learning teachers. In summary, the education system influences most aspects of how teachers search for educational resources online.

The proposed teacher educational resource search process steps are generic and could apply to any education system where teachers have freedom of choice in the resources they use. Some of the strategies for "collaborating", "searching for class", "evaluating", "adapting or creating", and "using" could also be transferable to other contexts considering the overlap with findings from Bortoluzzi and Marenzi [2], Burron and Pegg [4].

The interviews in this study showed that there are far fewer people sharing resources than people searching for them, yet the ecosystem works because of the abundance of available content.

As noted in the study's limitations, the interviews preceded widespread availability and use of generative AI tools. However, new AI tools would likely not significantly change the educational resource search process, because they do not impact pedagogical foundations, quality control, or community aspects. In the educational resource

search process, AI models are most likely to have an impact on the searching for self, searching for class, and adapting or creating tasks. Recommender models could be used to recommend ideas and resources instead of traditional search engines. Large language and image generation models could be particularly useful for adapting existing resources when directed by teachers, e.g., to differentiate a piece of text for pupils by adjusting its reading difficulty.

Developers of search systems designed to support educational research search should consider the strategies that teachers already use when searching for resources. Some examples could be making it easy to access visual previews of search results so teachers can quickly assess the looks of resources or highlighting the subject area(s) and age group(s) (or better, ability level(s)) that a resource is intended for. It would be interesting to explore search by dissimilarity (looking for results that match a given query but are different from a given result) to help users avoid getting trapped in a bubble of only similar search results.

6 Conclusion

This paper proposes a new teacher online educational resource search process model that combines previous models, and expands them with greater scope and detail specific to the school education domain. The model covers 10 tasks: "lesson planning", "searching for self", "collaborating", "searching for class", "evaluating", "adapting or creating", "using", "storing", "sharing", and "publishing". Detailed strategies and aspects of each task are grounded in the experiences of 15 school teachers in Scotland. The model complements existing research and offers insights into the influence of the education system context on teacher tasks in online educational resource search. We hope that a better understanding of teacher tasks will help inform the design of better search systems for education.

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A Interview script

Pre-study structured questionnaire.

(1) How did you hear about the study?
(2) Which school(s) do you teach at?
(3) Which tool(s) or website(s) do you currently use to find educational resources?
(4) Other comments

Introduction script. Hello [participant]. [Introduce researcher]. Thank you for joining me today. You might have signed up a while ago, do you remember what the study is about? [If unsure: we will be chatting about finding education resources online, trying to identify the kinds of tasks, needs, and challenges that are involved.] Although this is a formal study with ethics approval, and I will be analysing the results, I would really like us to have just a casual conversation. So that I can come back to it later and review, I would like to record our meeting, if that is okay with you? [Wait for confirmation]
You can turn off your camera now if you would rather that your video is not included in the recording.
If there is anything you would like me to strike from the recording during or after our conversation, just let me know by email, you'll have my contact address from the calendar invitation.
Before we start, do you have any questions about this study?
[start recording]

Observation tasks/questions.

Finding / Using:

(1) Tell me about a class you teach – how many pupils are there? Are they at the same or different levels? Do your pupils have additional learning support needs? What is the available technology you have?
(2) What are you teaching in this class now? What will be the next topic you still need to prepare? (If not teaching now, what might be the next thing you would teach)?
(3) When you prepare for a new topic like this, where do you first start?
(4) If you are comfortable sharing your screen, could you show me, how would you go about finding online materials for this topic? If not, could you walk me through it?
  (a) If you already have all the materials you need, suppose a student comes into class asking for additional revision materials on the topic. Let's find something for this student.
(5) Would you use the found material?
  (a) Why / why not?
  (b) If would use: how would you look for more materials?
  (c) If not: How would you continue searching for better suited materials?
  (d) If resource is paid and would use: how would you pay for it? School funding or own money or . . . ?
(6) How would you go about searching for different materials (for the same topic, just different to what we found so far)?
(7) How would you go back to something useful you found earlier?
(8) Think of a topic that you do not know much about but can imagine having to teach. Show me, how would you look for materials about this topic?

Using:

(1) Consider the materials we found. What would you need to do to use them in your class?
(2) How would you do the adaptation? What tools would you use? How easy or difficult would this be?
(3) How would the materials found fit in with the other things you are teaching (previously and next)?

Sharing:

(1) Will you share the resources you have created without anyone asking?
(2) If a colleague from your school asked you for some help on this topic, how would you share your materials with them? Why this and not another method?
  (a) If not publishing: What if 3 colleagues from other schools asked about the same topic?
  (b) If not publishing: Why not publish?
(3) Would you contribute back to the resources that you found online? If so, how?

Ending structured questions.

(1) Please indicate your knowledge about Open Educational Resources (OERs)
  - Expert (would be confident to teach others about it)
  - Good knowledge (confident in understanding and using OER)
  - Some knowledge (can tell whether something is an OER)
  - Never heard of OERs before
(2) How often do you use OERs for teaching?
  - Never
  - Once a year or less
  - 2-4 times a year
  - 5-10 times a year
  - 1-3 times a month
  - Once a week or more

Ending open questions.

(1) Do you feel that there are important tasks you do when looking for materials that have not been considered today?
(2) Is there anything you wish you had or wish that the tool(s) or website(s) you currently use to search for materials were able to do?
(3) Is there anything else you would like to add?

Code	Task
LP	Lesson Planning and Preparing
SS	Searching for Self
C	Collaborating
SC	Searching for Class
E	Evaluating search results or resources
AC	Adapting or Creating resources
U	Using resources in class
St	Storing or saving resources for future reuse
Sh	Sharing resources with colleagues or friends privately
P	Publishing resources in larger communities or publicly

Table 4: Short codes for Educational Resource Search tasks

From/To	LP	SS	C	SC	E	AC	U	St	Sh	P
LP	–	3	2	7		3			1	
SS	2	–		3	2	2	1			
C	3	1	–	2		1			1	
SC		1	2	–	15	2	3	1		
E	1	1	3	9	–	2	1	2		
AC		2				–	2		1	
U				1		1	–	3	1	
St					1	1		–	2	1
Sh				1					–	1
P										–

Table 5: Counts of transitions between different tasks in individual search scenarios

B Search task transitions

In Table 5, a number N in the cell from SC to E means Searching for Class was directly followed by Evaluating N times. Self-transitions are not included because the breakdown of tasks into separate points is subjective and arbitrary. When a task was marked with multiple codes, all transitions are counted.

Annotated individual search scenarios are made available as supplementary material.