Optimising the efficacy of hybrid academic teams

Lessons from a systematic review process

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Undertaking a systematic review can have many benefits, beyond any theoretical or conceptual discoveries pertaining to the underlying research question. This paper explores the value of utilising a hybrid academic team when undertaking the systematic review process, and shares a range of practical strategies. The paper also comments on how such a hybrid team sits in a continuum of cooperation, coordination and collaboration. Key recommendations include choosing a great team, communicating well, documenting everything, and being explicit – for the benefit of your research team, and the readers of your systematic review.

Keywords: teams, collaboration, systematic reviews, protocols

While much has been written about the process-related elements of undertaking a systematic review or meta-analysis (Booth *et al.*, 2012; Durlak, 2008; Gough *et al.*, 2012; Littell *et al.*, 2008; Machi & McEvoy, 2012; Ridley, 2012), few publications discuss the practical elements, especially when undertaking such a process for the first time, and with a hybrid team. During 2015, a multidisciplinary team at a regional Australian university undertook a funded research project, using a systematic review framework. While the results of that review have been published (Lake *et al.*, 2017), this article documents and shares discoveries made by the team about practical elements, in the hope of supporting others who may be contemplating such an activity.

The core elements of a systematic review underpinned a research project that investigated alternative mathematics pedagogies for students with poor mathematics skills, in a higher education setting. The multidisciplinary project team comprised five academics from both the School of Education and the School of Environment, Science and Engineering, as well as a research assistant from the School of Environment, Science and Engineering and the School of Education liaison librarian. This hybrid team was based across two campuses. This was the first experience of participating in the systematic review process for many of the team members.

Systematic reviews

The systematic review was planned as the first stage of a multi-phase research project, and was intended to inform the direction of future research. The project team agreed on a commitment to an evidence-based approach, and elected to use a systematic review framework. While the evidence-based practice movement originated within the health and clinical sciences (Evidence-Based Medicine Working Group, 1992; Sackett *et al.*, 1996), the approach has since been adopted and adapted for use within the majority of professional disciplines (Booth, 2003; Borrego *et al.*, 2014; Davies, 1999; Webb, 2001). An increasing number of institutions, such as the Campbell Collaboration (2016) and the Evidence for Policy and

Practice Information and Co-ordinating Centre (EPPI-Centre, 2017), also support evidence-based research across a range of disciplines. In addition to publishing systematic reviews, such institutions generally produce a range of training materials and resources, designed to support those undertaking systematic reviews. Supplementary resources, including the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA, 2015) checklist and PRISMA flow diagram (Moher *et al.*, 2009), were also used throughout this research and review process.

While the processes of systematic reviews and meta-analyses are clearly defined in the literature (Cochrane Collaboration, 2016; Glass, 1976; Higgins & Green, 2011; Oxman & Guyatt, 1993), this clarity does not necessarily extend to researcher and practitioner understanding, especially in disciplines where these tools and frameworks have only recently been adopted. Evidence of confusion about both terms and processes can be found in discussion posts on many academic or researcher networks (Gray, 2016). Dawe (2016, para 1), for example, recently noted that:

'I'm working with an academic at the moment who insists he is doing a Systematic Review. I've looked at his question and it seems to me that what he's trying to do is a literature review that has some well-structured search documentation. I've sent him information on Systematic Reviews but he still insists that a SR is what he's doing.'

During the early stages of the research project, similar misconceptions were experienced by the project team. In order to provide clarity and structure, therefore, the following definition was adopted from the Centre for Cognitive Ageing and Cognitive Epidemiology (2013, para 3):

A systematic review answers a defined research question by collecting and summarising all empirical evidence that fits pre-specified eligibility criteria … A meta-analysis is the use of statistical methods to summarise the results of these studies.

The team approach

Effective teamwork (Gates & Hinds, 2000; Van Landingham, 2015) underpinned the review process. This was vital given the hybrid nature of the team. Each team member brought significant skills and/or expert knowledge to the project, in terms of discipline content, project management, or professional expertise. The advantage of this approach, according to Gates and Hinds (2000, p. 102) is:

'The combination of expertise with methodology, interest in the construct or process, comfort with the group approach, and diversity of perspectives and life experiences will foster the analytical approach desired to learn the essential attributes and multiple facets of the construct or process under study.'

The team was brought together to tackle a specific problem, drawing on the collective expertise and skills of individuals. In this way, an essential discipline was brought to the endeavour built around: the team shaping a 'meaningful common purpose'; the team identifying a performance goal (the provision of a systematic review report) flowing from the common purpose; a 'mix of complementary skills'; a strong commitment to completion (the funding and reporting requirements were time-bound); and mutual accountability (Katzenbach & Smith, 2013, pp. 38-39). Given the team's diverse nature, communication within and amongst the team members was critical. In the early stages of the project, the team members identified, discussed and documented decisions around communication, team member roles and responsibilities, and practical protocols.

The role of the project leader, a senior academic, was fundamental to the progress and success of the project. This role involved providing significant input into identification of suitable funding options, proposal writing and the overall mentorship of the group. The project leader brought this hybrid group together, actively mentored the research assistant, monitored timeframes, and provided critical input into the writing and editing process. In short, the team leader met the five conditions that Hackman (as cited in Coutu, 2013, p. 29) identifies as being essential to fulfilling and maintaining an effective team: bringing clarity; providing compelling direction; providing design and structure; supporting the team; and providing expert coaching. The other team member roles were defined as follows.

Funding allowed the appointment of a research assistant, and greatly facilitated the timely progression of both the review and its documentation as a written report. The research assistant worked closely with the librarian during the searching process, undertook the scanning and reading of the literature, developed inclusion/exclusion criteria, analysed the literature, created the draft report documents and sought feedback at every stage of the process. The project librarian worked with the team to refine the research question, and develop and conduct the necessary searches. The librarian also managed the discovered literature, and assisted in writing and editing. The librarian and research

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assistant worked particularly closely through most stages of the review project.

The discipline experts provided input and feedback throughout the entire process – assisting with the formulation of the research question, providing known resources, analysing the literature, and writing and editing the project report and associated publication. All team members had previously been involved in research projects, and all provided some form of mentoring and coaching from their own disciplinary perspectives throughout the project. However, this was the first experience the majority of team members had of the formal systematic review process. In addition to successfully completing the project, the team members gained insight and skill in the process, and all discovered the benefits of working within an effective hybrid team.

Working in collaboration with the librarian, for example, the research assistant learned more about systematic and structured approaches to both searching and managing information. In reverse, the librarian gained greater insight into the review and analysis of the literature, and experience in the use of analysis tools such as NVivo™. As part of refining the research question, and the writing of the report and paper, the librarian also gained content knowledge. In observing and participating in the systematic literature searching stage, the academics discovered practical strategies, approaches and frameworks not previously utilised.

The collaborative approach to the review and analysis of the literature also demonstrated the effectiveness of using a hybrid team within such a setting. Once the initial review framework was in place – created by the research assistant – the discipline knowledge and review experience of the academic team members was invoked. Specifically, each academic chose a number of the identified research studies, according to their area of expertise, and used the draft framework to review those studies. Results were then compared with the initial review. This approach tested the validity of the review framework, addressed the issue of potential bias (Littell *et al.*, 2008), and allowed for the development of the final inclusion/exclusion criteria. The diversity of the team allowed for an iterative approach to determining inclusion and exclusion criteria, in that it avoided the risk of group thinking, and encouraged active questioning (Katzenbach & Smith, 2013).

Communication within the team proved to be a critical element of the project (Lakhani *et al.*, 2012), as different team members had varying roles and responsibilities at different phases of the project. In addition, feedback or input was required from each team member at each stage. Identifying preferred communication approaches and strategies early in the process was an effective way of ensuring the process, and this included documenting communication protocols. Thus, emails were used to circulate working documents, to request input or feedback and to send deadline reminders. As well as face-to-face meetings, virtual meetings were conducted by Skype as required. The team identified the importance of knowing how team partners operated most efficiently, including knowing their communication and working preferences.

As the project progressed through the various stages of the systematic review – the formulation of the research question and search strategies; the retrieval and management, as well as the analysis and review of the literature; and the writing – the team members reflected upon and documented their discoveries and challenges pertaining to the process of undertaking a systematic review (Appendix A). As noted by Lakhani *et al.* (2012), a key attribute of effective teams is reflection. Critical reflection underpinned each stage of this project, from the formulation of the research question to the successful submission of the commissioned report and associated publication.

Protocols

A critical feature of a systematic review (and, indeed of a structured literature review) and any associated meta-analysis, is the need to record all the protocols associated with the project. As noted by Evans and Chang (2000, p. 2), an underlying purpose is to ensure that such reviews can be validated or replicated:

> '… systematic reviews should be conducted with the same rigour as any research endeavour. Like primary research, these reviews follow a predetermined plan which should be clearly documented. This documentation of the methods used, means systematic reviews can be replicated by other reviewers. It also allows the review methods used to be subject to appraisal.'

Protocols can be made publicly available: submitted to protocol registries such as PROSPERO (Centre for Reviews & Dissemination, 2017); published in relevant journals such as Systematic Reviews (2017) or the JBI Database of Systematic Reviews and Implementation Reports (2017); or published in systematic review databases such as the Cochrane Library (2017).

Clearly documenting the functional and operational protocols of a research project also assists in its smooth progression within a team environment. Protocols can

relate to practical aspects of the research, such as file management, software resources or searching, whereas other protocols may, for example, be more conceptual, and be associated with communication, ethics or confidentiality issues, or concern selected inclusion/exclusion criteria (Appendix A). The underlying lesson is to document protocols in as much detail as possible, especially at the time decisions are made, and have this documentation available to team members. This is particularly important when working within a team, or working on longer-term projects. While it is easy to assume that specific decisions or outcomes will be remembered, memories can become vague soon after the event. Furthermore, new team members or outside researchers wanting to check project details at a later date will be grateful.

Search protocols specifically need to be recorded as part of the standard systematic review process. There are examples in the published literature – be they journal articles or those systematic reviews available within specific databases – to guide a team regarding presentation. These can also be used to gather examples or ideas, or to identify formal guidelines or requirements. Depending on the discipline or topic area being investigated, a number of frameworks such as PICO (Problems, Interventions, Comparisons and Outcomes), SPIDER (Sample, Phenomenon of Interest, Design, Evaluation, Research type) and STARLITE (Sampling strategy, Type of study, Approaches, Range of years, Limits, Inclusions and exclusions, Terms used, Electronic sources) have also been developed to assist researchers structure their searches (Booth, 2006; Cooke *et al.*, 2012; Schardt *et al.*, 2007).

It became apparent in this study that the development, evolution and recording of search protocols represented a specialist domain of the librarian. While the team reviewed and approved, collectively, the search strategies proposed by the librarian and articulated through the protocols, it was clear that the librarian's specialist input to the project in this regard was vital. The value of including expert searchers in collaboration with content experts, especially when undertaking systematic reviews, is well documented (Beverley *et al.*, 2003; Dudden & Protzko, 2011; Federer, 2013; Harris, 2005; McCluskey, 2013; McGowan & Sampson, 2005; Papaioannou *et al.*, 2010; Zhang *et al.*, 2006). The involvement of a librarian in this team was essential in ensuring appropriate advice and guidance on efficient and effective search strategies, as well as how to record and manage them. For those inexperienced in structured literature searching, it is

possible to consider the use of Google Scholar as the default database for performing a systematic review. However, as Evans and Chang (2000) indicate, and as most of the team members were aware, systematic reviews need to be replicable, a characteristic that is impossible with Google Scholar due to the search algorithms and database structure that they employ (Giustini & Boulos, 2013). Clearly, the hybrid nature of the team and the specific skills and knowledge of members such as the librarian, helps to ensure that flawed approaches to the systematic review were avoided in its early stages.

Furthermore, if the research team includes higher degree research students or less experienced researchers, collaborating with a librarian during the literature searching stage may also have ongoing benefits, including training and/or up-skilling of those involved. More efficient or effective search strategies may be utilised with future literature searching, and researchers may consider using the systematic review process (or elements thereof) in future research projects. Indeed, one of the project team members now encourages his higher degree students to take a more structured approach to their literature searching, and to actively collaborate with their liaison librarian.

In addition to those resources found using deliberate searches related to subject or content, other literature will also be utilised, for example that deal with research methods or theoretical perspectives. Such literature may provide contextual information, or may add clarity to a concept or concepts, even though it may not relate directly to the specific research question. Furthermore, within any project, yet more literature will be discovered, either serendipitously or via recommendations from team members, colleagues or supervisors (Conn *et al.*, 2003; McManus *et al.*, 1998). The expert knowledge of academic team members is utilised in both the provision and evaluation of such material. Where such literature is directly relevant to the research question, should it have been retrieved as part of the formal searches already undertaken? If so, does the search strategy need to be adapted? If it is determined that a search strategy does need to be modified, this should occur early in the process, ideally before any reviewing of documents is undertaken. Where such additional resources introduce new ideas or concepts, rather than adding clarity or context, the search strategy and research focus would need to be re-examined.

To support the information management stage of the research process, there are a number of specialised database programs designed to both manage references

and to assist with the referencing process. EndNote™ is one such program, and was used by this research team (Peters, 2017). The geographically dispersed nature of the research team added additional challenges in terms of managing the project literature, and although EndNote™ offers synchronisation between desktop and online versions, specific protocols needed to be considered in the creation of and access to the EndNote™ library (Appendix A).

Similar protocols were developed during the analysis and review stage of the project. As with information management tools, there is a range of programs that can assist with the analysis process, especially within the qualitative research environment. For this project, the research assistant undertook the initial review of the studies using EndNote™ and NVivo™, and developed a review framework using Microsoft Excel™. Throughout this critical appraisal stage, the framework was tested for both practicality and potential bias, and inclusion/exclusion criteria were finalised and documented (Appendix A).

Whether the systematic review is being submitted to a formal evidence-based institution or to a journal or conference, protocols around the writing process also needed consideration (Boland *et al.*, 2014; Booth *et al.*, 2012; Phelps *et al.*, 2007; Thody, 2006). Within the team setting, will one member of the team write the review, with input and editing from team members, or will different team members be responsible for nominated sections? Who will undertake proof-reading and editing? Who will monitor the manuscript for a consistent writing style? Such questions reflect the importance of clear definition and communication of team roles.

Can a hybrid team successfully complete such tasks?

Much of what is described above may appear to be straightforward, and may, some will claim, simply be the bread and butter of academic activity. However, such activities take on an added level of complexity when undertaken within a hybrid team environment. It became apparent when considering both the roles of the team members, and the activities undertaken during the project, that consideration needed to be given to the criteria and characteristics indicative of successful teams. Katzenbach and Smith, for example, identify seven characteristics that differentiate a team from a working group. This is important, they argue, in that it focuses on performance results (Katzenbach & Smith, 2013, p. 37):

'A working group's [which comprises almost any gathering of workers in an organisation] performance is a function of what its members do as individuals. A team's performance includes both individual results and what we call "collective work products". … Whatever it is, a collective work product reflects the joint, real contribution of team members.'

Following this, Katzenbach and Smith also note that a team is characterised, first, by shared leadership roles. While the hybrid team described here initially started with singular leadership, as the process of the review rolled out, it became clear that, for example, the librarian needed to take a leadership role, especially in her field of expertise. In that context, she defined structures and processes, brought clarity and focus, and provided support and mentoring (*cf.* Coutu, 2013). The project success hinged, in part, on allowing this emergent leadership. In support of this, Lakhani also notes that 'designated team leaders and shared leadership have both been shown to be large contributors to interdisciplinary team effectiveness' (Lakhani *et al.*, 2012, p. E262). Balanced against this is individual and mutual accountability. An essential role of the team is to bring informed discussion, consideration and, eventually, consensus to the process – in short, the team needed to provide input to critical decisions around the search protocols, and then provide consensual agreement to these.

Continuing with Katzenbach and Smith's characterisations, the project maintained clarity regarding the team purpose, and worked towards its collective goal or work product, that is, the systematic literature review. All team discussions were focussed on that outcome, once the research direction was agreed upon. The path towards this outcome, however, required the encouragement of 'open-ended discussion and active problem-solving meetings', again as per Katzenbach and Smith (p. 36). The end product, the literature review, once embedded in a technical report to the funding body and published as an academic paper (Lake *et al.*, 2017) provided the essential performance measure.

While it was noted at the beginning of this paper that the team was brought together in a way that mirrored Katzenbach and Smith's (2013) 'essential discipline', and it appears that this discipline worked, it is admitted that the bringing together was not deliberate. What was intended, however, was that the team was assembled to meet the critical challenges of this project. The focus by the team leader was on the tasks required within the project rather than the discipline of the team per se. Nevertheless, the team functioned well, operating as a 'small number of people with complementary skills who are committed

COOPERATION	COORDINATION	COLLABORATION
Low trust – unstable relations	Medium trust – based on prior relations	High trust – stable relations
Infrequent communication flows	Structured communication flows	Thick communication flows
Known information sharing	'Project' related and directed information sharing	Tacit information sharing
Adjusting actions	Joint projects, joint funding, joint policy	Systems change
Independent/autonomous goals	Semi-independent goals	Dense interdependent relations and goals
Power remains with organisation	Power remains with organisations	Shared power
Resources – remain own	Shared resources around project	Pooled, collective resources
Commitment and accountability to own agency	Commitment and accountability to own agency and project	Commitment and accountability to the network first
Relational time frame requirement – short term	Relational time frame medium term – often based on prior projects	Relational time frame requirement – long term 3-5 years

Figure 1. An integrated view of cooperation, coordination and collaboration in research projects (used with permission Keast & Mandell, 2011)

to a common purpose, set of performance goals, and approach for which they hold themselves mutually accountable' (Katzenbach & Smith 2013, p. 39). Is this unique to a hybrid team conducting a systematic review? Unlikely. Indeed, other writings about team success focus on other aspects of the team. Gratton and Erickson (2013) for example, discuss behaviour – leading by example, provision of the 'gifts' of mentoring and coaching, building relationships, drawing both task and relationship skills amongst the team members, and building on prior ('heritage') working relationships.

In this study, the researchers had worked together previously, and two were the research assistant's PhD supervisors. Some of the academics had also worked with the project librarian. The project built upon this network of prior relationships, and was also able to draw upon the elements of cohesion and mutual respect, other key attributes of interdisciplinary teams (Lakhani *et al.*, 2012).

Is a hybrid team a collaboration?

The literature on teams and team development discussed above suggests further comment on the relationship between the hybrid team structure and collaboration, specifically, where the hybrid team structure sits in a continuum of cooperation, coordination and collaboration of people working together (Keast & Mandell, 2011). Figure 1 outlines the features of each of the three categories in terms of both relationships and resources, of people working together in active team networks of three or more people. It can be argued that in the systematic review stage, the protocols and decision-making processes of this hybrid team were more aligned

with Coordination, since the project was not geared, in this early phase, towards systems change (in shaded rows in column three). Consideration of these categories, however, may be useful to researchers considering a hybrid team approach, particularly where a longer-term project is being considered since, ideally, some effort will need to be made towards collaboration in this network sense.

This project team began in a medium trust relationship, where several team members already had an experience of working together and were prepared to accommodate and understand the nature of their colleagues' communication and working preferences. Upon analysis, it appears that the team is evolving towards a high trust relationship evidenced by stable relations within the team structure and thicker communication flows as the project develops. While communication started as project related, the use of protocols as outlined above has supported tactical information sharing based on interdependent goals. In the longer time-frame it is hoped to establish the team's actions as committed to systems change, since the nature of the longer-term project is to improve the system in which mathematics learning takes place. This team, like others in such projects, will need to consider how to reconfigure this unique team structure such that resources are pooled and committed to such system change and, hence, accountable to the collaborative network first and foremost. Based on the current working relationship and what it has provided already, this is certainly achievable.

Conclusion

Undertaking a systematic review and associated meta-analysis has been a highly rewarding experience for

this multidisciplinary and geographically dispersed team. In addition to the discoveries made regarding the underlying research question, the team members have also learned a great deal about the practical processes involved when utilising a systematic review framework. The entire process has been grounded in reflection on the nature, development and effectiveness of hybrid teams, and where such teams may sit within a continuum of cooperation, coordination and collaboration. The purpose of this paper has been to share both practical and conceptual discoveries, in order to encourage and support others who may be considering undertaking such a review – within any discipline in the higher education setting. Key recommendations include choosing a great team, communicating well, documenting everything, and being explicit – for the benefit of your research team, and for the readers of your systematic review.

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Appendix A

Practical considerations when undertaking a systematic review

Communication
What are the team members' preferred means of communication?
How do individual team members respond to requests for input or comment or review? Is the absence of a reply to be taken to indicate implicit agreement?
Are team members responsive to deadlines?
If urgent responses are required, should the request be issued via email, or by other more direct means (where possible)?
Should meetings be regular or scheduled as required?
Protocols
Is it required or recommended that the protocol be publicly registered or published?
How will the project protocols be documented for the team, and what level of detail/granularity is recorded?

What documentation format will be used - Word documents, spreadsheets, OneNote or Evernote files or NVivo™ memos?
Where will the project documentation be stored, and who can access this?
How will documentation be shared? Via email, cloud drives?
How will version control of files be organised? Can older versions be restored?
Can files be viewed and edited simultaneously? Can changes be annotated with date and editor information?
Which team members will have full write access and which will have read only access to files?
How regularly will files be backed up; where will backup files be stored; who will be able to access them?
What software packages (and versions) will be used in the management of records and the analysis of the data?

If any project files are confidential, how will security be maintained?

Has a research data management plan been considered?

How will time frames and time lines be managed? Will project journals or logs be used?

Discovery and searching

What database(s) will be used, and why?

What database(s) will be deliberately excluded, and why?

Will a database Thesaurus tool be used to identify relevant terms or formal subject headings? If so, will the associated Scope Notes be recorded?

What search terms / synonyms / phrases will be used?

What Boolean or proximity operators will be applied to the search terms?

What filters/limits will be applied and why?

Will detailed search results and associated dates be recorded?

Will Google Scholar be used, in addition to structured databases, to identify key literature? Will the difficulty of replicating searches in Google Scholar (due to changing algorithms) be considered?

Will Google Scholar or Google be used to locate grey literature? What limits will be applied? Will site / domain name filters, or language / region filters be used?

Will resources found by serendipity or by direct recommendation be included?

Does such additional literature enhance or clarify concepts already identified in the review process, or does it bring new ideas? If new ideas are introduced, how will this impact on the review process?

Should such additional resources have been retrieved within the formal searches already undertaken? Will the search strategy be adapted to include such resources?

At what stage during the review process is it feasible / manageable to update or adapt search strategies?

Will saved searches and/or search alerts be created, so newly published resources can be identified throughout the project lifecycle?

How will additional resources be recorded and managed, in relation to the formal search results?

Managing the literature

What database or reference management software will be used? Who will be the database administrator?

Is simultaneous access to the library/database available? Which team members require access?

How can the team ensure that members have the necessary skills to utilise the requisite software?

Will all team members be able to add new records to the database, or will citations/documents be sent to designated team members for inclusion?

What file/folder structure will be put in place? How will changes to a folder structure be communicated and managed?

Will file/folder naming conventions, such as prefixes, be developed and documented?

How will resources be shared with team members who do not have full access to the literature library / database?

If standard fields are to be used for non-standard content, how will this be documented?

Will possible differences in layout / presentation / structure between desktop & web-based versions of the selected software impact on project processes?

Will a temporary library be used while the research question and associated search strategies are tested and refined?

Reviewing and analysing

How will inclusion / exclusion criteria and associated justifications be documented during the review process?

Will each study be reviewed by more than one coder/rater/ reviewer, in order to reduce bias? How will the literature be allocated to reviewers?

If using a software package, will it allow multiple user access? What privileges are available for different users, for example editors and viewers?

Is the analysis software compatible with reference management software and/or word processing software?

What text analysis or visualisation tools are available within the analysis software?

Does the analysis software allow searching across all fields?

What export formats are available from the software?

Are training resources and technical support provided?

Writing and referencing

Who will have the primary responsibility for writing reports or publications? Will different team members write different sections? Who will edit? Who will check for consistent style?

If referring to commercially available products (such as databases or reference management software) do they stipulate the use of trademarks or symbols (for example EndNote™)?

If the preferred journal has a word count that does not allow for the inclusion of all analysis tables, do they offer alternatives such as online supplements?

Are there specific referencing requirements for included resources, for example ‘Citing and using PRISMA’ (PRISMA, 2015)?

Which referencing style does the journal or publisher use? Are associated style files provided or available, for use with reference management software?

Will individual references be checked, especially when using reference management software and their associated style files?

Will the CrossRef database be used to verify or check references?